WESTERN ALASKA
SUBAREA CONTINGENCY PLAN

SENSITIVE AREAS
SECTION

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SENSITIVE AREAS: INTRODUCTION

This section is intended for use by the On-Scene Coordinators during the initial phase of a spill event to assist in ascertaining the location and presence of spill-sensitive biological and cultural resources, services and users in the Western Alaska Subarea. This information is specific to the Western Alaska Subarea and was compiled by a multi-organization Sensitive Areas Work Group. No attempt has been made to duplicate information contained in easily accessible existing documents. This section, therefore, must be used in conjunction with the referenced materials and informational contacts identified herein. More detailed and current data should be available from on-scene resource experts, when they become engaged in the response. This information is geared toward early response. If appropriate, natural resources trustees may be conducting natural resource damage assessment (NRDA) activities in conjunction with response activities. Information regarding NRDA activities should be directed to the natural resources trustees or to their appointed NRDA Liaison.

Often, the most detailed, up-to-date biological and resource use information will come from people who live and work in the impacted area. People from the local community are often knowledgeable sources for information related to fishing, hunting, non-consumptive outdoor sports, and subsistence use. They may also have a good idea of which spill response techniques (especially exclusion and diversion booming) are practicable under prevailing weather and current conditions.

The Alaska Regional Response Team has developed a series of guidelines (see the Alaska Federal/State Contingency Plan for Response to Oil & Hazardous Substance Discharges/Releases (Unified Plan)) covering the decision processes for: application of dispersants, use of *in situ* burning, and protection of wildlife. Protection of cultural resources will be accomplished by implementation of the *Programmatic Agreement on Protection of Historic Properties during Emergency Response under the National Oil and Hazardous Substances Pollution Contingency Plan (Programmatic Agreement)*. The National Oceanic and Atmospheric Administration Scientific Support Coordinator has developed a Shoreline Countermeasures Manual which provides helpful information on clean-up options by shoreline type. In addition, Environmental Sensitivity Index maps have been produced that illustrate selected sensitive resources and shoreline types. These guidelines and tools are not duplicated here.

This section and the guidelines in the Unified Plan are also intended for use by facility/vessel operators in developing industry oil spill prevention and contingency plans. For an operator's facility or area of operation, industry contingency plans describe: (a) environmentally sensitive areas of public concern; (b) how sensitive areas would be prioritized during a spill event; and (c) response strategies to protect sensitive areas at risk. This information within industry plans should be consistent with the subarea plans.

The definition of sensitive resources and their geographic locations requires use of field observations and data available from published and non-published materials or through additional field work. With the limited time and funds available for Subarea Contingency Plan development (there are ten such plans covering the state of Alaska), not all the detailed information necessary to adequately complete the Sensitive Areas Section was compiled. Identifying relative priorities among resources and resource uses takes considerable coordination and discussion among resource management agencies.

A substantial effort to develop and refine a sensitive areas database was undertaken by Alaska Clean Seas (ACS) and was produced in their Alaskan Bering Sea Coastal Resources Manual, Norton Sound Region. The ACS material was developed with input from federal and state and local agencies. This information is incorporated, by reference, into this section (with the permission of ACS).

Many of the maps presented in this section are available on-line through the Internet at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html

The joint Federal-State Subarea Contingency Plan for this subarea is scheduled to be updated periodically. Much can be done in these updates to improve the data and its presentation, such as:

- Review and provide updated information for the Alaskan Environmental Sensitivity Index (ESI) maps.
- Enter the sensitive areas and ESI data into a commonly accessible geographic information system (GIS), standard base maps, and verify data quality.
- Complete work identified in Part Five, Significant Data Gaps and Information Needs, to adequately address sensitive areas and resources.
- Establish a continuing interagency mechanism to review, update and maintain sensitivity information and priorities.
- Subdivide the area into smaller geographic areas and identify more specifically sensitive seasonal biological and other resource locations.
- Fund staff/materials to compile data and prepare materials for presentation in the Subarea Contingency Plans.
- Expand and further detail sensitive resources and initial response tactics for the most likely spill scenarios.

Suggestions, comments, and more current information are requested. Please contact either:

Doug Mutter
Department of the Interior
Office of Environmental Policy
and Compliance
1689 C Street, Room 119
Anchorage, Alaska 99501
(907) 271-5011
FAX (907) 271-4102
email: douglas_mutter@ios.doi.gov

Jack Winters
Alaska Department of Fish and Game
Habitat and Restoration Division
1300 College Road
Fairbanks, Alaska 99701
(907) 459-7285
FAX (907) 456-3091
email: jack_winters@fishgame.state.ak.us

SENSITIVE AREAS: PART ONE - INITIAL CONTACTS

[see Table at end of Part One for contact information]

Agency	Resources	Primary Contact	Alternate Contact
FISH and WILDLIFE and HABITAT RESOURCES			
Alaska Department of Fish and Game	fish, shellfish, birds, terrestrial mammals, marine mammals	Jack Winters	Mark Fink
U.S. Department of the Interior	migratory birds, sea otters, polar bears, walrus, endangered species, anadromous fish in freshwater, bald eagles, wetlands	Pamela Bergmann	Doug Mutter
U.S. Department of Commerce	sea lions, seals, whales, endangered marine species, anadromous fish in marine waters	Michael Payne	Brad Smith
U.S. Department of Agriculture	none in this subarea	none	none
Alaska Natural Heritage Program	rare and endangered plants	Julie Michaelson	Ron Lipkin
CULTURAL and ARCHAEOLOGICAL SITES			
Alaska Office of History and Archaeology	historic sites, archaeological sites, national register sites	Judy Bittner	Joan Dale
U.S. Department of the Interior	Archaeological/historical sites in park and wildlife refuge system units, public lands, Native allotments/trust lands; sunken vessels	Pamela Bergmann	Doug Mutter
U.S. Department of Agriculture	none in this subarea	none	none
SHORELINE TYPES			
Scientific Support Coordinator	shoreline types, environmental sensitivity index maps	John Whitney	

LAND OWNERSHIP and CLASSIFICATIONS/DESIGNATIONS			
Alaska Department of Natural Resources	state lands, state parks and recreation areas, state forests, tidelands	Sam Means	Deborah Heebner
Alaska Department of Fish and Game	state game refuges, state critical habitats	Jack Winters	Mark Fink
U.S. Department of the Interior	national parks and preserves, national historic sites, national monuments, national wildlife refuges, public lands, national recreation areas, wild and scenic rivers, wilderness areas, Native trust lands	Pamela Bergmann	Doug Mutter
U.S. Department of Agriculture	none in this subarea	none	none
U.S. Department of Defense	military installations and reservations	Alaska Command	none
Local Governments: City of Bethel	municipal and private lands, and rights-of-way	Gail Alstrom	
COMMERCIAL HARVEST			
Alaska Department of Fish and Game	fishing permits, seasons	Jack Winters	Mark Fink
Alaska Department of Natural Resources	tideland leases, logging on private lands	Sam Means	Deborah Heebner
Alaska Department of Environmental Conservation	seafood processing	Manny Soares	Janice Adair
U.S. Department of Commerce	fishing permits, seasons	Michael Payne	Brad Smith
SUBSISTENCE, PERSONAL, AND SPORT USES			
Alaska Department of Fish and Game	subsistence and personal uses statewide and navigable waters, sport hunting and fishing	Jack Winters	Mark Fink
U.S. Department of the Interior	subsistence uses on Federal lands and reserved waters; subsistence uses of: sea otters, walrus, polar bears, migratory birds	Pamela Bergmann	Doug Mutter
U.S. Department of Commerce	subsistence use of: whales, porpoises, seals, sea lions	Mike Payne	Brad Smith

RECREATION AND TOURISM USES			
Alaska Department of Natural Resources	State parks and recreation areas, anchorages, boat launches, campgrounds, State public lands	Sam Means	Deborah Heebner
Alaska Department of Fish and Game	sport hunting and fishing	Jack Winters	Mark Fink
Alaska Department of Community & Economic Development	seasonal events and activities, travel, outdoor activities, local visitor bureaus, tourism industries	Alaska Division of Tourism	
U.S. Department of Agriculture	none in this subarea	None	none
U.S. Department of the Interior	recreation uses in park and wildlife refuge system units and Federal public lands	Pamela Bergmann	Doug Mutter
WATER INTAKE and USE FACILITIES			
Alaska Department of Environmental Conservation	public drinking water wells, treatment, and storage, fish processing facilities	Cindy Christian	Lee Johnson
Alaska Department of Fish and Game	hatcheries, ocean net pens and release sites, aquaculture	Jack Winters	Mark Fink
Alaska Department of Natural Resources	tidelands leases, aquaculture sites, private logging camps and log transfer facilities	Sam Means	Deborah Heebner
U.S. Coast Guard	marinas and docks, mooring buoys	Marine Safety Office, Anch.	17th District, Juneau
AREAS OF LOCAL CONCERN			
Cenaliulriit Coastal Resource Service Area	coastal program special areas, plans, policies	Gail Alstrom	
City of Bethel	coastal program special areas, plans, policies	John Malone	

CONTACT INFORMATION:

Agency	Primary Contact		Alternate Contact	
	Name	Numbers	Name	Numbers
Alaska Department of Fish and Game	Jack Winters	work: 459-7285 fax: 456-3091 emer: 479-2320 email: jack_winters@fishgame.state.ak.us	Mark Fink	Work: 267-2338 fax: 267-2464 emer: 337-7933 email: markf@fishgame.state.ak.us
Alaska Department of Natural Resources	Sam Means	work: 269-8548 fax: 269-8913 emer: 345-3486 email: samm@dnr.state.ak.us	Deborah Heebner	Work: 269-8557 fax: 269-8913 emer: 562-3212 email: deborah_heebner@dnr.state.ak.us
Alaska Department of Environmental Conservation	Cindy Christian	work: 451-2138 fax: 451-2188 emer: 488-0270 email: cindy_christian@envircon.state.ak.us	Lee Johnson	Work: 451-2179 fax: 451-2187 emer: 479-5017 email: Ljohnson@envircon.state.ak.us
	Manny Soares	work: 269-7640 fax: 269-7510 emer: 333-5312 email: msoares@envircon.state.ak.us	Janice Adair	Work: 269-7645 fax: 269-7651 emer: 243-2140 email: jadair@envircon.state.ak.us
Alaska Department of Community and Economic Development	Alaska Division of Tourism	work: 465-2012 fax: 465-3767 emer: email: GoNorth@dced.state.ak.us		Work: fax: emer: email:
Alaska Natural Heritage Program	Julie Michaelson	work: 257-2788 fax: 257-2782 emer: 746-0959 email: anjam1@uaa.alaska.edu	Rob Lipkin	Work: 257-2785 fax: 257-2782 emer: email: anrl@uaa.alaska.edu
Alaska Office of History and Archaeology	Judy Bittner	work: 269-8721 fax: 269-8908 emer: 274-7165 email: Judy_Bittner@dnr.state.ak.us	Joan Dale	Work: 269-8721 fax: 269-8908 emer: email: joan_dale@dnr.state.ak.us
U.S. Department of the Interior	Pamela Bergmann	work: 271-5011 fax: 271-4102 emer: 333-0489 email: pamela_bergmann@ios.doi.gov	Doug Mutter	Work: 271-5011 fax: 271-4102 emer: 345-7726 email: douglas_mutter@ios.doi.gov

U.S. Department of Commerce	Mike Payne	work: 586-7235 fax: 586-7012 emer: 586-7639 email: Michael.Payne@noaa.gov	Brad Smith	Work: 271-5006 Fax: 271-3030 Emer: 248-4211 Email: Brad.Smith@noaa.gov
U.S. Department of Agriculture	none in this subarea	work: fax: emer: email:	none in this subarea	Work: Fax: Emer: Email:
U.S. Department of Defense	Alaska Command	work: 552-3944 fax: 552-4855 emer: 552-3000 email:	none	Work: Fax: Emer: Email:
U.S. Coast Guard	Marine Safety Office, Anchorage	work: 271-6700 fax: 271-6751 emer: 271-6700 email:	17th District, Juneau	Work: 463-2025 Fax: Emer: Email:
Scientific Support Coordinator	John Whitney	work: 271-3593 fax: 271-3139 emer: 346-1634 emailJohn_Whitney_AKSSC@hazmat.noaa.gov		Work: Fax: Emer: Email:
Local Governments: --Cenaliulriit Coastal Resource Service Area, St. Mary's --City of Bethel	Gail Alstrom, Coastal Coordinator John Malone, Coastal Coordinator	work: 438-2638 fax: 438-2643 emer: email: Gail_Alstrom@yahoo.com Work: 543-5301 fax: 543-4186 emer: jfmalone@gci.net email: john_malone@ddc-alaska.org		Work: Fax: Emer: Email: Work: Fax: emer: email:

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SENSITIVE AREAS: PART TWO-AREAS OF ENVIRONMENTAL CONCERN

A. BACKGROUND/CRITERIA

The following relative priority listing was developed by the Sensitive Areas Work Group, with representatives from State and Federal agencies and the private sector. The list prioritizes resources into designations of major, moderate, and lesser concern. Resources are not prioritized within each designation. These designations are for consideration in initial spill response activities, they are not applicable to extended clean-up activities. This prioritization scheme must be used in conjunction with spill-specific information (e.g., size and location of spill, type of product, trajectory) to determine the actual protection priorities for that discharge. Specific guidance to On-Scene Coordinators for protecting cultural resources is contained in Annex M of the Unified Plan. Data gaps in the index are discussed in Part Five, Significant Data Gaps and Information Needs.

The following criteria were developed as tools to establish levels of concern. These criteria are not listed in a priority order.

CRITERIA FOR RELATIVE PRIORITY RATING

- human economic disruption -- economic/social value; human food source disruption
- mortality -- wildlife, fish, other organisms (how many potentially killed in relation to abundance)
- animal displacement and sensitivity to displacement
- aesthetic degradation
- habitat availability and rarity
- sublethal effects, including sensitivity to physical or toxic effects of oil or hazardous substances and long-term affects to habitat, species, or both
- threatened and endangered species, and/or other legal designation
- persistent concentration of oil or hazardous substances
- reproduction rate or recolonizing potential
- relative importance to ecosystem
- potential for physical contact with spill--pathway of oil or hazardous substances
- resource sensitivity to response measures

B. AREAS OF MAJOR CONCERN

Shoreline Geomorphology - Coastal Habitat Types:
- River deltas
- Sheltered lagoons
- Open lagoons
- Salt marshes
- Mud flats
- Barrier islands
- Spit beaches
- Protected bays

Upland Habitat Types:
- Riparian Willow

Lake and River Habitats:
- Connected lakes
- Freshwater springs

Threatened or Endangered Species Habitat:
- Steller's Eider Critical Habitat
- Spectacled Eider Critical Habitat
- Steller Sea Lion Haulouts and Rookeries

Harbor Seal Haulout Areas (>10 animals)
Spotted Seal Haulout Areas (> 10 animals)
Walrus Haulout Areas
Beluga Whale Concentration Areas
Caribou Calving and Insect Relief Areas
Large Seabird Colonies (> 100 birds)
Waterfowl and Shorebird Spring and Fall Concentration Areas
Anadromous Fish Spawning and Rearing Streams (i.e., salmon, Dolly Varden, whitefish)
Herring Spawning Areas
Land Management Designations:
- Federal: Wilderness
  - Wild and Scenic Rivers
  - National Natural Landmarks
- State: Refuges

Cultural Resources/Archaeological Sites:
- National Historic Landmarks
- Burial Sites
- National Register Eligible Village Sites
- Intertidal Sites

Subsistence Harvest Areas
High Commercial Use Areas
High Recreational Use Areas

C. AREAS OF MODERATE CONCERN

Spotted Seal Haulout Areas (< 10 animals)
Harbor Seal Haulout Areas (< 10 animals)
Ringed Seal Shorefast Ice Concentration Areas
Seabird Colonies (10 - 100 birds)
Waterfowl and Shorebird Nesting or Molting Concentration Areas
Anadromous Fish Streams (rearing only)
Bear Concentration Areas (marine mammal/carcasses; salmon)
Commercial Harvest Areas
Recreational Use Areas
Land Management Designations:
- Federal: National Parks
  National Wildlife Refuges

Cultural Resources/Archaeological Sites:
- National Register Eligible Sites (Other Than Village Sites)
- Sites Adjacent To Shorelines

D. AREAS OF LESSER CONCERN

Upland Habitat Types:
- Mesic/dry tussock tundra
- Alpine tundra

Gray Whale Nearshore Migration and Feeding Areas
Walrus General Distribution
Seabird Colonies (< 10 birds)
Waterfowl and Shorebird General Distribution
General Freshwater Fish Habitat
Land Management Designations:
- Federal: Public Lands
  National Preserves
- State: General Public Lands

SENSITIVE AREAS: PART THREE - RESOURCE SENSITIVITY

The following sensitivity tables were developed by the Sensitive Areas Work Group, with representatives from State and Federal agencies and the private sector (not all information is complete at this time). Where references are available they are noted at the end of the tables. Periods and/or conditions when resources are of varying levels of concern (most, medium, least) with respect to oil spill impacts are noted in the following tables.

GEOMORPHOLOGY

(references: 1, 17, 18, 20)

CATEGORY	LEAST	MEDIUM	MOST
COASTAL HABITAT TYPES			River deltas Sheltered lagoons Open lagoons Salt Marshes Barrier islands Mudflats Spit beaches Protected bays
LAKE AND RIVER HABITAT TYPES			Connected lakes Freshwater springs
UPLAND HABITAT TYPES	Alpine tundra Mesic/dry tussock tundra		Riparian Willow

THREATENED OR ENDANGERED SPECIES

(references: 1, 3, 4, 5)

CATEGORY	LEAST	MEDIUM	MOST
ENDANGERED SPECIES			WHALES: Bowhead, Northern Right, Humpback PINNIPEDS: Steller sea lion BIRDS: Short-tailed albatross
THREATENED SPECIES			Spectacled eider, Steller's eider
POTENTIAL SPECIES		Bristle-thighed curlew North American Lynx	
PROTECTED SPECIES			Bald Eagle, Golden Eagle All marine mammals

RINGED SEALS

(references: 3, 5, 11, 14, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE		pack ice	shorefast ice
SUSCEPTIBILITY		year around	
HUMAN HARVEST	Nov 1 - Jan 15		Jan 15 - Oct 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Nearshore concentrations in shorefast ice	==========										=======	
Pupping and Weaning			=========									
Molting			==========									
Present in area	==========											

BEARDED SEALS

(references: 3, 11, 13)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE			ice-edge
SUSCEPTIBILITY		year around	
HUMAN HARVEST	Nov 1 - Jan 15		Jan 15 - Oct 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Pupping			=========									
Present in Bering Sea	==========											

SPOTTED SEALS

(references: 3, 11, 16, 25, 26)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE (ON HAULOUTS)	< 10	10 - 100	> 100
SUSCEPTIBILITY		year around	
HUMAN HARVEST	Nov 1 - Jan 15		Jan 15 - Oct 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Pupping				======								
In Nearshore waters					==========							

HARBOR SEALS

(references: 25, 26)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	<10	10 - 100	>100
SUSCEPTIBILITY		year round	
HUMAN HARVEST	Nov 1 - Jan 15		Jan 15 - Oct 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Coastal haulouts					==========							
Pupping					======							
In Nearshore Waters	==========											

BELUGA WHALES

(references: 3, 5, 11, 12, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	< 10	10 -50	> 50
SUSCEPTIBILITY	Nov 15 - Mar 31		Apr 1 - Nov 15
HUMAN HARVEST	Oct 1 - Apr 15		Apr 15 - Oct 1

[1] Concentrations of Beluga whales occur at the mouths of the Yukon River from mid June to mid August

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
In Nearshore waters					==========							
Calving					======							

GRAY WHALES

(references: 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	Dec 1 – Apr 30	May 1 - Nov 30	
SUSCEPTIBILITY		When Present	
HUMAN HARVEST			Mar 1 - Apr 15 Aug 15 - Nov 15

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Nearshore migration & feeding					==========							

WALRUS

(references: 3, 5, 18, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	Dec 1 - Apr 1	Jul 1 - Sep 15	Apr 1 - Jul 1 Sep 1 - Dec 1
SUSCEPTIBILITY		year around	
HUMAN HARVEST			Apr 15 - May 30 Aug 15 - Oct 15 Dec 1 - Mar 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Present on haulouts or in nearshore waters					==========							

POLAR BEARS

(references: 3, 7, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	Open Water	Shore-fast Ice	Pack Ice/Shorefast Ice Flaw
SUSCEPTIBILITY			year around

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Denning of pregnant females	=======										======	
Along or on the coastline	=======											

BROWN BEAR/BLACK BEAR

(references: 3, 5, 6, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
SUSCEPTIBILITY	Nov 1-Apr 1	Apr 1 - Oct 30	
HUMAN HARVEST	Nov 1-Apr 1	Jun 1 - Aug 1	Apr 1 - May 30 Aug 1- Oct 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Denning	==========										=======	
Concentration associated w/ mammalian food sources					==========							
salmon streams						==========						

CARIBOU

(references: 3, 5, 6, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE *			
SUSCEPTIBILITY	Nov 1 - Mar 15	Mar 15-May 20 Aug 15-Sep 15	May 20 - Aug 15 Sep 15 - Oct 31
HUMAN HARVEST	Apr 1 - Aug 10 Oct 1 - Oct 30		Nov 1 - Apr 1 Aug 10 - Sep 30

*Seven herds use various portions of this region. Depending on the general herd size, location, insect presence, and the climatic conditions; abundance may vary widely. As a result, specific abundance figures will not be established for use in prioritizing the importance of an area.

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Calving period					==							
Insect Relief habitat						=====						

MUSKOXEN

(references: 25)

CATEGORY	LEAST	MEDIUM	MOST
SUSCEPTIBILITY		Year-round	
HUMAN HARVEST	Sep 1 - Sep 30; Feb 1 - Mar 25		

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Calving					======							

WATERFOWL AND SHOREBIRDS

(references: 1, 3, 5, 6, 17, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	In Prep.		
SUSCEPTIBILITY	Nov 1 - Apr 1	Apr 1 - May 15	May 15 - Nov 1
HUMAN HARVEST*	Nov 1 - Apr 1	July 1 - Aug 1	Apr 1 - Jun 30; Aug 1 - Nov 1

* Waterfowl eggs are harvested from early May through late July.

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Arrival/Nesting/broodrearing					==========							
Molting/feeding concentrations						==========						
Fall migration							==========					

SEABIRDS

(references: 1, 3, 9, 17, 19, 24, 25)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	< 10	10 - 100	> 100
SUSCEPTIBILITY *	Nov 1 - Jan 31	Feb 1 - March 31	Apr 1 - Nov 1
SPECIES DIVERSITY	1 – 3	4 - 6	> 6
HUMAN HARVEST **			Apr 1 - Nov 1

* Some seabirds may winter in leads in the ice

** Seabird eggs are harvested from May through July

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
At breeding colonies				==========								
Feeding near colonies				==========								

SALMON (pink, chum, coho, sockeye, and chinook)

(references: 2,3,4,6,9,24,25,26,27)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	All anadromous fish streams in this area are considered important.		
SUSCEPTIBILITY	June 15 - Jul 15		Jul 15 - June 15
HUMAN HARVEST			May 20 - Sep 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Spawning							==========					
Eggs/fry in gravels	==========							==========				
Year-around rearing in freshwater	==========											

DOLLY VARDEN

(references: 2, 3, 4, 24, 25, 26, 27)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	All anadromous fish streams in this area are considered important.		
SUSCEPTIBILITY		June 1 - Sept 15	Sep 15 - June 1
HUMAN HARVEST			Year-round

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Spawning									========			
Overwintering	==========										========	
Eggs/fry in stream gravels	==========								==========			
Rearing in freshwater	==========								==========			

ANADROMOUS WHITEFISH

(references: 2, 3, 4, 24, 25, 26, 27)

CATEGORY	LEAST	MEDIUM	MOST
ABUNDANCE	Limited Data are Currently Available on Fish Populations within Western Alaska Area Streams		
SUSCEPTIBILITY		June 1 - Sep 15	Sep 15 - June 1
HUMAN HARVEST			Year-round

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Spawning									======			
Overwintering	==========										=======	
Spring migration						=======						
Fall migration									==========			

PACIFIC HERRING

(references: 3, 4, 5, 24, 25, 26, 27)

CATEGORY	LEAST	LEAST	MOST
Abundance			
Susceptibility			May 1 - Aug 30
Human Harvest		July 1 - Sep 30	May 1 - June 30

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Spawning					======							
Overwintering	==========										=======	

FRESHWATER FISH

(references: 2, 3, 4, 22, 23, 24, 25)

CATEGORY	LEAST	LEAST	MOST
ABUNDANCE	Limited Data are Currently Available on Fish Populations in Many Western Alaska Area Streams		
SUSCEPTIBILITY		Jun 1 - Oct 1	Oct 1 - Jun 1
HUMAN HARVEST			year-round

Critical Life Periods	J	F	M	A	M	J	J	A	S	O	N	D
Spawning												
Spring					======							
Fall									======			
Overwintering	==========								========			

LAND MANAGEMENT DESIGNATIONS

(references: 24, 25, 26, 27)

CATEGORY	LEAST	MEDIUM	MOST
FEDERAL LANDS	Public Land	National Parks Wildlife Refuges	Wild & Scenic Rivers Wilderness Areas National Natural Landmarks
STATE LANDS	Public Land*		Refuges

* Includes submerged lands out to 3 miles and historic bays and inlets.

CULTURAL RESOURCES/ARCHAEOLOGICAL SITES

(references:)

CATEGORY	LEAST	MEDIUM	MOST
CULTURAL AND ARCHAEOLOGICAL SITES	Cultural Resources that do not meet National Register criteria	National Register eligible sites (excluding villages sites) Sites adjacent to shorelines	National Historical Landmarks National Natural Landmarks Burial sites National Register eligible village sites Intertidal sites

HUMAN USE AREAS

(references:)

TO BE DEVELOPED

CATEGORY	LEAST	MEDIUM	MOST
NON-CONSUMPTIVE USES			
UNIQUE FISHING SITES			
TIMBER INDUSTRY			
MINERAL USE AREAS			

SUBSISTENCE HARVEST AREAS

Contact the Native Corporation, IRA Council, or City Council offices of the potentially affected communities for information regarding current subsistence harvest areas. See Section E.4.d., Subsistence and Personal Use Harvest.

REFERENCE DOCUMENTS FOR SENSITIVITY TABLES

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SENSITIVE AREAS: PART FOUR - BACKGROUND INFORMATION

INTRODUCTION

The background information contained in this section is a mixture of references to readily available documents, knowledgeable contacts, and data not readily available elsewhere. Several industry-generated references that have had agency input and review are incorporated by reference.

a. See Alaska Clean Seas' Alaskan Bering Sea Coastal Resources Manual: Norton Sound (1987). This report includes narrative and maps covering the coast from the Diomede Islands and Cape Prince of Wales southward along Norton Sound to Hooper Bay in the Yukon-Kuskokwim River Delta area. Information covers:

(1) Biological resources
(2) Cultural and historic sites
(3) Shoreline characteristics
(4) Physical environment
--physiography
--meteorology
--oceanography
(5) Biological environment
--ecosystems
--environmentally unique and sensitive areas
--birds
--terrestrial mammals
--marine mammals
--threatened species
--fishery resources
(6) Spill response information

b. The Office of the National Oceanic and Atmospheric Administration Scientific Support Coordinator, Anchorage, Alaska has copies of the Research Planning Institute coastal sensitivity maps for the Bristol Bay region and Norton Sound and the Pribilof Islands. These maps encompass the entire coastline found within the Western Alaska subarea.

LAND MANAGEMENT MAPS

The Alaska Department of Natural Resources, under agreement with the Alaska Department of Environmental Conservation, produced digital base and land management maps for each of the Subareas using their ARC-INFO based Geographic Information System. For selected areas of high sensitivity and/or risk, sensitive areas maps are also being produced (in coordination with the National Oceanic and Atmospheric Administration's Environmental Sensitivity Index mapping schema). Contact the Scientific Support Coordinator (907-271-3593).

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Insert Insert Land Management Map Legend page here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 1 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 2 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 3 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 4 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 5 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 6 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 7 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 8 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 9 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert Insert Land Management Map 10 of 10 here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

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A. LAND MANAGEMENT DESIGNATIONS

1. Access to Lands

Land ownership must be determined and landowners contacted to evaluate incident-specific protection priorities, obtain land-use permitting requirements, and obtain permission to access lands. Native corporation lands, as well as local, State, and Federal government lands often require special use permits. If an incident affects private lands or Native Allotments, permission to enter lands should be sought from the landowner. The local Borough government is often the best source of private land ownership records.

2. State

Cape Newenham State Game Refuge is the only State legislatively-designated area for special uses in the Western Alaska Subarea. The 13,952 acre refuge encompasses Chagvan Bay, a large shallow estuarine embayment know for its vast eelgrass beds. In the spring and fall, hundreds of thousands of ducks, geese, and shorebirds stop at Chagvan Bay to rest and feed on their way to and from nesting grounds to the north. The bay is especially critical to brant which stop in spring to feed on eelgrass.

3. Federal

Yukon Delta National Wildlife Refuge, the largest of Alaska's 16 refuges, encompasses over 26 million acres of land and water on the Yukon-Kuskokwim Delta (including Nelson and Nunivak Islands). The Yukon-Kuskokwim Delta contains the termini of the two largest rivers, in length and discharge, in Alaska, as well as innumerable lakes and ponds, and forms the dominant landscape of the refuge. Upland areas, the southern Nulato Hills in the northern part of the refuge and the Kilbuck Mountains along the refuge's eastern boundary, contain peaks of 2,000 to 3,000 foot elevation. The abundance of water in the lakes, ponds, streams, inlets, bays, and coastal areas provides important habitat for waterbirds. Although the refuge supports a varied population of mammals, fish, and birds which are important to maintaining the traditional subsistence lifestyle of local residents, it is the nesting and rearing habitat of four geese species (cackling Canada geese, Pacific flyway white-fronted geese, emperor gees, and brant) and other waterfowl, shorebirds, and seabirds which are of national significance.

Togiak National Wildlife Refuge encompasses about 4.3 million acres of land between Kuskokwim Bay and Bristol Bay in southwestern Alaska. The refuge is bordered on the north by the Yukon Delta National Wildlife Refuge. Five species of salmon and several species of resident fish occur in the streams and lakes of the refuge. Over 30 species of mammals are present, including brown and black bear, moose, caribou, wolves, and wolverine. Sea lions, walrus, and harbor seal inhabit coastal areas. The refuge's coastal lakes, bays, and wetlands also are heavily used by migrating waterfowl in spring and fall. Seabirds occupy rugged coastal cliffs along the refuge's coastline.

Innoko National Wildlife Refuge - Southern Unit encompasses about 3.8 million acres of land. The western boundary of the refuge is formed by the Yukon River. The Innoko River flows through the heart of the refuge. Nearby communities include Grayling on the Yukon River and Shageluk just south of the refuge on the Innoko River. Extensive wetlands with abundant small lakes and streams occur over much of the refuge and are particularly abundant on the southern portion of the refuge. The extensive wetlands support large numbers of nesting waterfowl, furbearers, and moose. Black and grizzly bear, and caribou also occur on the refuge. The extensive streams and wetland complexes support abundant fish, particularly northern pike and whitefish. Chinook, chum , and coho salmon also occur on the refuge.

Alaska Maritime National Wildlife Refuge Public lands on islands, barrier islands, islets, rocks, reefs, and spires in the Bering Sea make up the Bering Sea Unit of the Refuge. St. Matthew Island is the largest island in the refuge within the Western Alaska area. The Alaska Maritime Refuge consists of over 2,400 islands, headlands, rocks, islets, spires, and reefs along the Alaskan coast, stretching from Southeast Alaska to Cape Lisburne on the Chukchi Sea. The Refuge is

synonymous with seabirds. About 75 percent of Alaska's marine birds (15 to 30 million of 55 species) use the Refuge. The Refuge also is home to thousands of sea lions, seals, walrus, and sea otters. Wildlife viewing, photography and backpacking are primary uses of the Refuge.

Lake Clark National Park and Preserve The northern portions of Lake Clark National Park and Preserve are contained within the boundaries of the Western Alaska Subarea. The Park and Preserve encompasses approximately 4 million acres and provides habitat for Dall sheep, moose, caribou, brown and black bear, wolves, foxes, beaver, and other furbearers. Raptors are common, as are waterfowl and songbirds. Fish are abundant in lakes and streams of the area, and include salmon, whitefish, Dolly Varden, Arctic grayling, and lake trout.

B. HABITAT TYPES

Shoreline habitats have been defined and ranked according to Environmental Sensitivity Index (ESI) standards produced by the National Oceanic and Atmospheric Administration in (Environmental Sensitivity Index Guidelines (October 1997)). Hardcopy ESI maps produced in 1982 are available for the subarea. Updated ESI information can be found on the internet at: http://response.restoration.noaa.gov/order/esiindex.html

1. Benthic Habitats

Oil vulnerability is lower in benthic areas than in the intertidal zone since contamination by floating slicks is unlikely. Sensitivity is derived from the species which use the habitat. Benthic habitats have not been traditionally classed by ESI rankings, but are treated more like living resources which vary with season and location. Benthic habitats include: submerged aquatic vegetation beds, large beds of kelp, worm reefs, coral reefs.

2. Shoreline Habitats

Habitats (estuarine, large lacustrine and riverine) ranked from least to most sensitive (see the following table) are described below:

ESI #1--Exposed impermeable vertical substrates: exposure to high wave energy or tidal currents on a regular basis, strong wave-reflection patterns common, substrate is impermeable with no potential for subsurface penetration, slope of intertidal zone is 30 degrees or greater, attached organisms are hardy and accustomed to high hydraulic impacts.

ESI #2--Exposed impermeable substrates, non-vertical: exposure to high wave energy or tidal currents on a regular basis, strong wave-reflection patterns regular, substrate is impermeable with no potential for subsurface penetration over most of intertidal zone, slope of intertidal zone is less than 30 degrees, there can be accumulated but mobile sediments at the base of cliff, attached organisms are hardy and accustomed to high hydraulic impacts.

ESI #3--Semi-permeable substrate: substrate is semi-permeable with oil penetration less than 10 cm, sediments are sorted and compacted, slope is less than 5 degrees, sediment and potential for rapid burial mobility is low, surface sediments are subject to regular reworking by waves, there are relatively low densities of infauna.

ESI #4--Medium permeability substrate: substrate is permeable with oil penetration up to 25 cm, slope is 5 - 15 degrees, rate of sediment mobility is high with accumulation of up to 20 cm of sediments in a single tidal cycle, sediments are soft with low trafficability, low densities of infauna.

ESI #5--Medium to high permeability substrate: substrate of medium to high permeability which allows oil penetration up to 50 cm, spatial variations in distribution of grain sizes with finer ones at high tide line and coarser ones in the storm berm and at toe of beach, 20 percent is gravel, slope between 8 and 15 degrees, sediment mobility is high during storms, sediments are soft with low trafficability, low populations infauna and epifauna except at lowest intertidal levels.

ESI #6--High permeability substrates: substrate is highly permeable with oil penetration up to 100 cm, slope is 10 to 20 degrees, rapid burial and erosion of shallow oil can occur during storms, high annual variability in degree of exposure and frequency of wave mobilization, sediments have lowest trafficability of all beaches, natural replenishment rate is the lowest of all beaches, low populations of infauna and epifauna except at lowest intertidal levels.

ESI #7--Exposed flat permeable substrate: flat (less than 3 degrees) accumulations of sediment, highly permeable substrate dominated by sand, sediments are well saturated so oil penetration is limited, exposure to wave or tidal-current energy is evidenced in ripples or scour marks or sand ridges, width can vary from a few meters to one kilometer, sediments are soft with low trafficability, high infaunal densities.

ESI #8--Sheltered impermeable substrate: sheltered from wave energy and strong tidal currents, substrate of bedrock or rocky rubble, variable in oil permeability, slope greater than 15 degrees with a narrow intertidal zone, high coverage of attached algae and organisms.

ESI #9--Sheltered flat semi-permeable substrate: sheltered from wave energy and strong tidal currents, substrate is flat (less than 3 degrees) and dominated by mud, sediments are water-saturated so permeability is low, width varies from a few meters to one kilometer, sediments are soft with low trafficability, infaunal densities are high.

ESI #10--Vegetated wetlands: marshes and swamps with various types of emergent herbaceous grasses and woody vegetation over the substrate.

3. Upland Habitats

At this time, no uplands or wetlands classifications directly related to sensitivity to oil spills has been identified. A general wetlands classification has been developed by the U.S. Fish and Wildlife Service, National Wetlands Inventory, in Anchorage. Considerable mapping of wetlands has been completed, some of which are available in a Geographic Information System database (see the following figure). Updated map data is being placed on the National Wetlands Inventory Internet web site at: http://www.nwi.fws.gov/reg7web.htm

Regional Wetlands Coordinator
National Wetlands Inventory
Anchorage Alaska
786-3471

ESI HABITAT RANKING

ESI NO.	ESTUARINE	LACUSTRINE	RIVERINE (large rivers)
1 A	Exposed rocky cliffs	Exposed rocky cliffs	Exposed rocky banks
1 B	Exposed sea walls	Exposed sea walls	Exposed sea walls
2	Exposed wave-cut platforms	Shelving bedrock shores	Rocky shoals; bedrock ledges
3	Fine- to medium-grained sand beaches	Eroding scarps in unconsolidated sediments	Exposed, eroding banks in unconsolidated sediments
4	Coarse-grained sand beaches	Sand beaches	Sandy bars and gently sloping banks
5	Mixed sand and gravel beaches	Mixed sand and gravel beaches	Mixed sand and gravel bars and gently sloping banks
6 A	Gravel beaches	Gravel beaches	Gravel bars and gently sloping banks
6 B	Riprap	Riprap	Riprap
7	Exposed tidal flats	Exposed flats	Not present
8 A	Sheltered rocky shores	Sheltered scarps in bedrock	Vegetated, steeply sloping bluffs
8 B	Sheltered sea walls	Sheltered sea walls	Sheltered sea walls
9	Sheltered tidal flats	Sheltered vegetated low banks	Vegetated low banks
10 A	Saltwater marshes		
10 B	Freshwater marshes	Freshwater marshes	Freshwater marshes
10 C	Freshwater swamps	Freshwater swamps	Freshwater swamps
10 D	Mangroves		

"Environmental Sensitivity Index Guidelines" (October 1995) NOAA Technical Memorandum NOS ORCA 92

Insert Wetlands Status map here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html

C. BIOLOGICAL RESOURCES

1. Fish and Wildlife

The Western Alaska Subarea has a diverse array of habitats and an equally diverse complement of species that use these habitats. Some of the species found in this region spend only a brief but essential portion of their life cycle here. The abundance of water in lakes, ponds, streams, inlets, bays, and coastal areas provides habitat for waterfowl form all four North American flyways. Not only does this area, specifically the Yukon Delta National Wildlife Refuge, support a varied population of mammals, fish and birds which are important in maintaining the traditional subsistence way of life of local residents, it also is the nesting and rearing habitat of four geese species (cackling Canada geese, Pacific flyway white-fronted geese, emperor geese, and brant) and other waterfowl, shorebirds, and seabirds which are of national significance.

(a) Threatened and Endangered Species

Federally listed threatened and endangered species are protected under the Endangered Species Act. Spill response activities which could impact a listed species should be coordinated with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. The northern right whale, humpback whale, short-tailed albatross, and Eskimo curlew are also on the State of Alaska's endangered species list. Threatened and endangered species potentially present in the Western Alaska Subarea include:

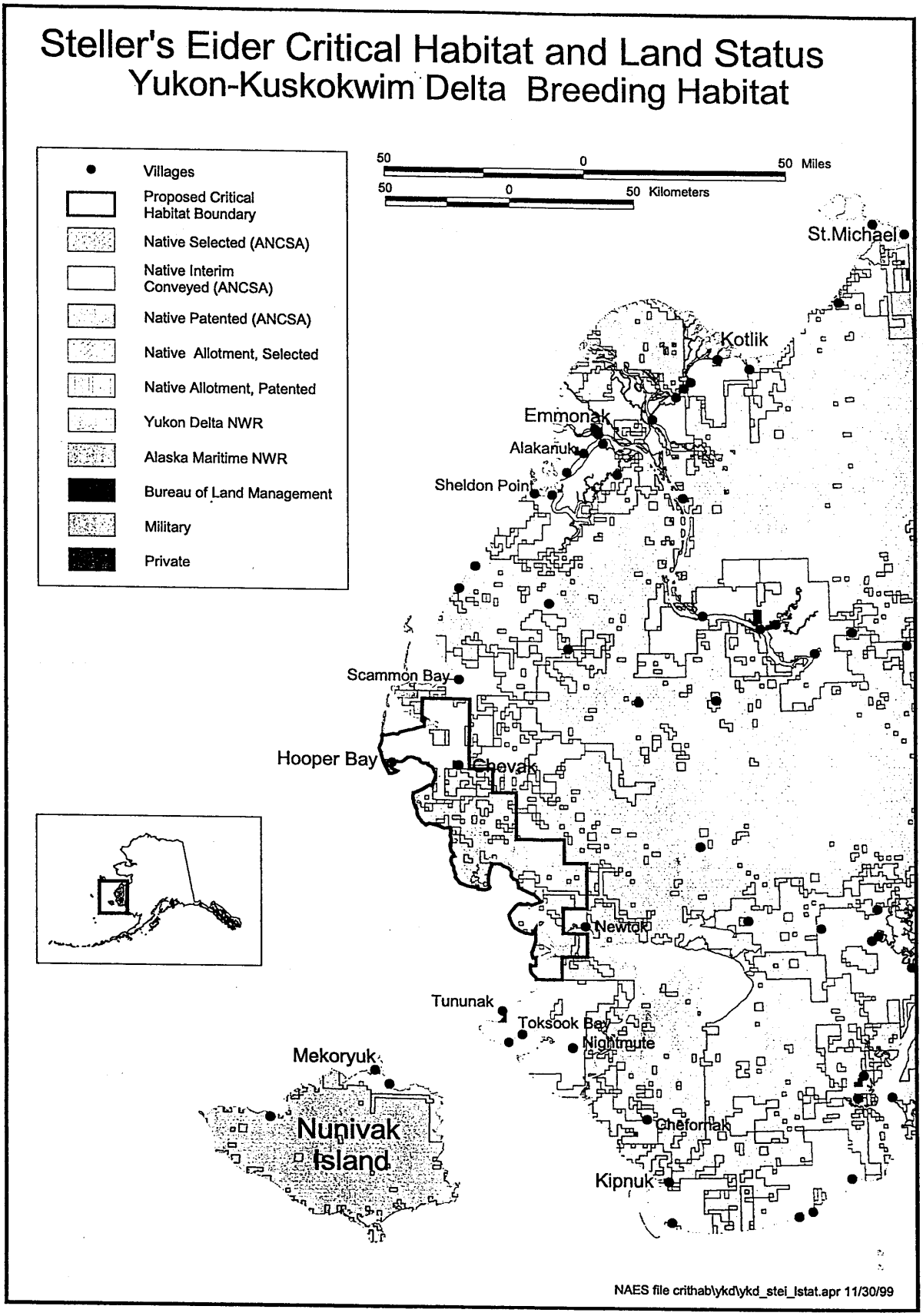
Common Name	Scientific Name	Occurrence
Bowhead whale	*Balaena mysticetus*	Occasional Migrant
Northern right whale	*Eubalaena glacialis*	Occasional Migrant
Humpback whale	*Megaptera novaeangliae*	Summer Resident
Steller sea lion	*Eumetopias jubatus*	Resident
Eskimo curlew	*Numenius borealis*	Possibly Extinct
Spectacled eider	*Somateria fischeri*	Resident
Steller's eider	*Polysticta stelleri*	Resident
Short-tailed albatross	*Diomedea albatrus*	Possible Visitor

Critical habitat has been designated by the U.S. Fish and Wildlife Service for spectacled eiders along the Yukon-Kuskokwim Delta (for breeding), and for Steller's eiders between Scammon Bay and Tununak (for breeding) and offshore around Nunivak Island and in Kuskokwim Bay (see following maps).

Although the U.S. Fish and Wildlife Service has determined the Arctic peregrine falcon is no longer a threatened species, monitoring of the species will continue following the 1994 delisting.

Although Alaskan Bald and golden eagles are not on the endangered species list, they are fully protected (including their nests and nest trees) under the Bald Eagle Protection Act of 1940. Spill response activities that could affect these species should be coordinated with the U.S. Fish and Wildlife Service.

All marine mammals, whether or not they are on the endangered species list, are protected by the Marine Mammal Protection Act of 1972. Any spill response activities which could affect marine mammals should be coordinated with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. For updated information try the internet at: http://www.r7.fws.gov/es/te.html


Steller's Eider Critical Habitat and Land Status
Yukon-Kuskokwim Delta Breeding Habitat
Villages
Proposed Critical Habitat Boundary
Native Selected (ANCSA)
Native Interim Conveyed (ANCSA)
Native Patented (ANCSA)
Native Allotment, Selected
Native Allotment, Patented
Yukon Delta NWR
Alaska Maritime NWR
Bureau of Land Management
Military
Private
50 0 50 Miles
50 0 50 Kilometers
St.Michael
Kotlik
Emmonak
Alakanuk
Sheldon Point
Scammon Bay
Hooper Bay
Chevak
Newtok
Tununak
Toksook Bay
Nightmute
Mekoryuk
Nunivak Island
Chefornak
Kipnuk
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Steller's Eider Proposed Critical Habitat
Marine Units
Anchorage
Kachemak Bay
Kodiak Island
Alaska Peninsula, south side
Bethel
Dillingham
Egegik Bay
Ugashik Bay
Cinder River
Port Heiden
Seal Islands
Cape Seniavin
Nelson Lagoon
Izembek Lagoon
Bechevin Bay
Eastern Aleutians
Kuskokwim Bay
Nunivak Island
Villages and Cities
Proposed Critical Habitat
National Wildlife Refuge
150 Miles
100
50
0
50
150 Kilometers
100
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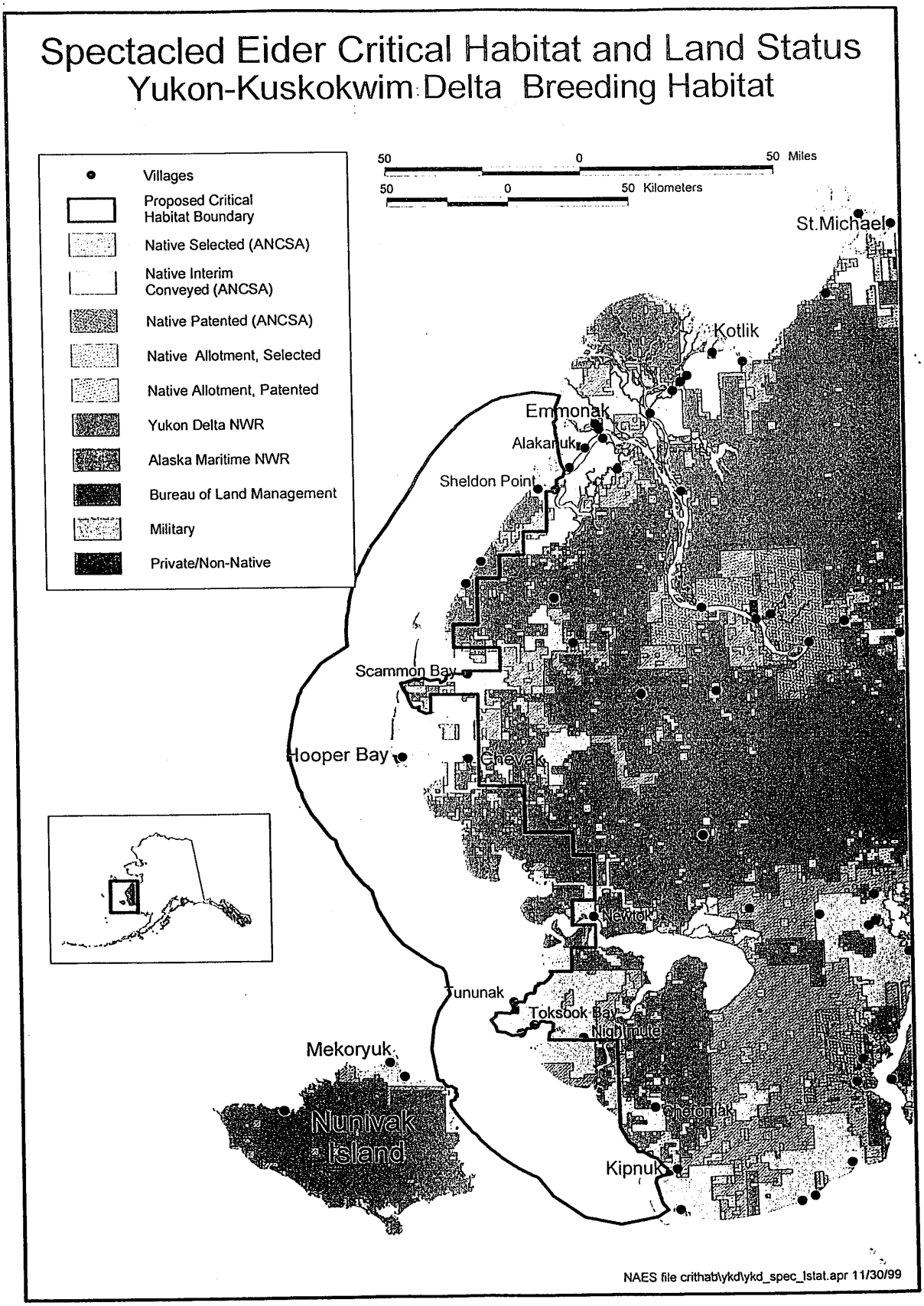
Spectacled Eider Critical Habitat and Land Status
Yukon-Kuskokwim Delta Breeding Habitat
Villages
Proposed Critical Habitat Boundary
Native Selected (ANCSA)
Native Interim Conveyed (ANCSA)
Native Patented (ANCSA)
Native Allotment, Selected
Native Allotment, Patented
Yukon Delta NWR
Alaska Maritime NWR
Bureau of Land Management
Military
Private/Non-Native
50 0 50 Miles
50 0 50 Kilometers
St.Michael
Kotlik
Emmonak
Alakanuk
Sheldon Point
Scammon Bay
Hooper Bay
Chevak
Newtok
Tununak
Toksook Bay
Nightmute
Mekoryuk
Nunivak Island
Chefornak
Kipnuk
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(b) Fish

The Western Alaska Subarea is drained by a number of major rivers, including the Kuskokwim, Yukon, Innoko, Goodnews, Kwethluk, and Kanektok rivers. Most of the flowing waters and many of the lakes support populations of anadromous or resident species of fish. Lagoons and estuarine areas are important rearing and overwintering areas for anadromous fish. River deltas are particularly important areas for fish throughout the year. Shallow lakes, oxbows, and seasonally-flooded wetlands connected to streams or rivers may support fish during the summer but may freeze to the bottom in winter.

If the depth of the water exceeds that of the seasonal ice thickness, fish may be found in a particular waterbody year-round. Deep lakes and rivers, and spring-fed stream systems serve as overwintering areas for fish.

Fish may use shallow lakes (< 2-3 m deep) in summer if the lakes are connected to a stream system (i.e., tapped lakes) and sufficient water exists in late summer for fish to leave the lake and move to overwintering areas. Shallow tundra beaded streams (< 2-3 m deep) freeze solid in winter and thus can be used by fish only for summer rearing. River deltas are particularly important areas for fish throughout the year. Although many rivers have not been examined for overwintering fish, those portions of rivers with depths greater than 2-3 m should be considered potential fish overwintering habitat and protected accordingly.

RESIDENT FISH

The most common resident fish found in rivers and lakes in the Western Alaska Subarea include arctic grayling, northern pike, burbot, and whitefishes. Whitefish species include humpback, round, and broad whitefish; and least and Bering cisco. Other species that occur include lake trout, rainbow trout, slimy sculpin, Dolly Varden, longnose sucker, Alaska blackfish, and arctic lamprey. Resident species found on Nunivak Island include Arctic grayling, Alaska blackfish, Arctic char/Dolly Varden, threespine stickleback, and ninespine stickleback.

Arctic grayling are distributed widely in most clearwater streams and some of the deeper lakes. Arctic grayling spawn in May and June over substrates ranging from silt to gravel in small streams or in lakes. Arctic grayling often feed in shallow streams throughout the summer that may freeze solid in winter. Arctic grayling winter in deep, large rivers or lakes, or in smaller streams if adequate water quality and flow exists throughout the winter.

Whitefish Broad and humpback whitefish, and least cisco are found commonly in summer in slow-moving waters of sloughs, and interconnected lakes, the lower reaches of large rivers, and in nearshore marine waters. Round whitefish are found more commonly in streams or lakes. Bering cisco are found in the Yukon and Kuskokwim river drainages. These five species of whitefish spawn in late September and early October over sand and gravel bottoms of streams and lakes. These whitefish generally overwinter in deep, large rivers or lakes, although some may overwinter in estuarine areas.

Northern pike are found commonly in summer in slow-moving waters of sloughs and interconnected lakes, in larger rivers and some of the large lakes throughout the Subarea. Northern pike spawn in the spring shortly after breakup in shallow water with emergent vegetation and little current. Northern pike overwinter in deep, large rivers or lakes, or in smaller tributary streams if adequate water quality and flow exists.

Dolly Varden Stream-resident Dolly Varden occur in headwaters or in clearwater tributaries of major rivers. Stream resident Dolly Varden in the Kuskokwim and Yukon river drainages congregate in areas where salmon spawn to feed on salmon eggs. Stream-resident Dolly Varden spawn in late September or October.

Burbot are found in portions of the Western Alaska subarea, in both rivers and in deep lakes. They also are found in summer in interconnected lakes and sloughs in lowland areas. Burbot overwinter in deep, large rivers or lakes, or in smaller tributary streams if adequate water quality and flow exists.

Lake trout are found in the large deep lakes along the Alaska Range at the eastern margin of the Western Alaska region. Lake trout also are found in Kagati and Goodnews lakes and probably other large deep lakes in the Togiak National Wildlife Refuge. Lake trout occur in lakes in the Kuskokwim River drainage including, Aniak, Kisaralik, and Whitefish lakes. Lake trout spawn in September.

Rainbow trout occur in some drainages in the Western Alaska subarea. The Kuskokwim River drainage is the northwestern limit of its natural range in Alaska. Rainbow trout are found in the Kwethluk, Kasigluk, Kisaralik, and Aniak rivers, tributaries of the lower Kuskokwim River. Rainbow trout are also reported in the Eek River. Major concentrations are found in the Togiak, Kanektok, Arolik, and Goodnews rivers, as well as in most drainages of the Togiak National Wildlife Refuge. The rainbow trout in the Western Alaska region are not known to be anadromous. Spawning occurs in spring (late May or June).

ANADROMOUS FISH

Sheefish The Yukon and Kuskokwim rivers support populations of anadromous sheefish that spawn in the upper reaches of these rivers. These anadromous sheefish overwinter in the lower rivers. Immature fish use and the lower rivers during summer. Fish that will spawn in the current year begin an upstream migration from estuarine areas at breakup. Sheefish enter spawning areas August and early September and spawn in late September and early October. The two known spawning areas for Kuskokwim River sheefish are Big River and Highpower Creek. Yukon River anadromous sheefish spawn upstream of the boundaries of the Western Alaska Subarea.

Whitefishes Anadromous whitefish (broad and humpback whitefish, least and Bering cisco) migrate from overwintering areas to estuarine and nearshore brackish marine waters at breakup - mid May to early July. The whitefish remain in the nearshore marine and estuarine environment for several weeks to several months. Whitefish return to overwinter and spawn in major rivers in September and October. Some may overwinter in estuarine areas.

Dolly Varden Juvenile Dolly Varden spend up to their first five years in freshwater streams before migrating to marine summer feeding areas. Immature and mature Dolly Varden migrate from overwintering areas to marine feeding areas following breakup - mid May to early July. Fish begin returning to freshwater spawning and overwintering areas from July through October. Spawning occurs from September through December. Fry emerge from the streambed gravels between April and early June. Spawning and overwintering areas are restricted to streams with perennial springs and groundwater sources. Dolly Varden inhabit nearly all of the region's drainages, including those on Nunivak, St. Matthew, and Nelson islands.

Salmon Chinook, coho, sockeye, pink, and chum salmon occur within the Western Alaska region. Coho and chum are the most common and widely distributed species. Pink salmon are moderately abundant in the lower reaches of the major rivers. Sockeye salmon are least abundant. Salmon are present in estuaries and bays three to four weeks before spawning (see below). Pink, chum, coho, and sockeye salmon occur on Nunivak Island. Salmon eggs incubate in the stream gravels over the winter, fry hatch in mid or late winter, and migrate to sea following breakup in early May to late June (for chum and pink salmon fry; chinook, sockeye, and coho fry will remain in fresh water from one to four years before migrating to sea).

Lower Kuskokwim River Area Salmon Run Timing

Species	Migration Through Lower River	Spawning
Chinook	May 20 to June 30	July 10 to August 1
Pink	June 20 to July 20	July 1 to August 1
Chum	June 1 to Aug 15	July 15 to August 15
Sockeye	June 1 to July 15	July 20 to August 15
Coho	July 15 to October 1	Sept 15 to October 30

Quinhagak and Goodnews Districts

Species	Present in Bays and Estuaries	Spawning
Chinook	June 1 to July 1	July 15 to July 30
Chum	June 15 to August 1	July 15 to August 15
Sockeye	June 15 to August 1	August 15 to Sept 30
Pink	June 15 to August 1	July 1 to July 30
Coho	August 1 to Sept 30	Sept 15 to October 30

Lower Yukon River Area Salmon Run Timing

Species	Migration into Lower River	Spawning
Chinook	May 15 to July 15	July 1 to August 1
Pink	June 20 to July 15	---
Summer Chum	May 25 to July 15	July 1 to Aug 5
Fall Chum	July 15 to Sept 10	---
Coho	July 20 to Sept 10	---

MARINE FISH

Pacific herring Known herring spawning concentration areas occur along the coast from Cape Newenham to and in Goodnews Bay, near Kwigillingok, in Kinak Bay, along portions of Nelson Island and Hazen Bay, in Kokechik Bay, and in Scammon Bay. Herring spawn in shallow bays, inlets, lagoons, rocky shorelines, and on rocky headlands from early May through mid June.

Pacific herring arrive at the Security Cove and Goodnews Bay districts in early to mid May. Pacific herring spawn in the Nelson and Nunivak Island areas between early May and early June. They spawn in the Kokechik Bay area from mid May to mid June. Major herring spawning areas occur along portions of the south coast, most of the east and northeast coast, and portions of the north coast of Nunivak Island.

(c) Birds

The Western Alaska subarea provides important wetland areas for nesting waterfowl (ducks, geese, and swans) and other birds, and serves as an important spring and fall staging area and migratory route for those birds headed to and returning from more northerly feeding and nesting areas. Waterfowl are concentrated on areas of open water along the major rivers in spring before wetland areas thaw. Important nesting, molting, and spring and fall staging areas include: the wetlands of the entire Yukon-Kuskokwim River Delta, the coastal wetland lakes and bays of the Togiak National Wildlife Refuge, the wetlands in and around the Innoko National Wildlife Refuge, and wetlands associated with the inland river systems found in the subarea.

Ducks begin arriving in the subarea in early April and continue to arrive through the end of May, although most ducks have arrived by mid May. Nesting begins in mid May, with most eggs hatching from mid June through mid July. Broods are reared on lakes, ponds, flooded wetlands, coastal lagoons, and rivers. Some ducks begin molting in mid June, most during July, and a few are still in molt condition in early September. Large numbers of scoters and eiders molt in lagoons and sheltered bays. Important feeding and fall staging areas for ducks include river deltas, lagoons, salt marshes, mudflats, and coastal tundra areas. Some ducks begin their fall migration in mid July, although most leave the mainland areas from late August through early October. Some ducks remain until late October before leaving at freeze-up. Eiders and some sea ducks may winter in recurring polynyas near St. Matthew and Nunivak islands.

Geese Canada, emperor, and white-fronted geese and brant nest, molt and stage along lakes, coastal lagoons, wetlands, and rivers within the subarea. Snow geese stage within the region during spring and fall migrations, but do not breed in the region. Birds arrive from early April through mid May; nest, molt, and rear young from mid May through the end of August; and undertake fall staging and migration during September through October.

Swans The largest nesting population of tundra swans occurs within the Yukon-Kuskokwim river delta. A few trumpeter swans also occur in the area. Swans arrive in the region from mid April through May. Swans begin nesting around mid May, and eggs hatch from mid-to-late June. Molting occurs from mid July through late August. Young swans are unable to fly until September. Fall staging and migration occurs in September and October.

Birds of prey occurring in the Western Alaska subarea include golden and bald eagles; osprey**;** gyrfalcon, peregrine, and other falcons; goshawks and other hawks; and owls. Golden eagles, peregrine falcons, gyrfalcons, and rough-legged hawks nest on coastal or inland cliffs, bluffs, or other steep terrain. Snowy and short-eared owls nest on the tundra. Hawks and other owls commonly use woodlands, forests, and forested wetland areas for nesting. Prime feeding areas for many raptors include wetlands containing waterfowl, seabirds, shorebirds, and other small birds.

Seabirds (northern fulmars, murres, auklets, puffins, kittiwakes) are most abundant in the Cape Newenham area, at Cape Peirce, and at St. Matthew, Hall, and Pinnacle Islands. Cape Mohican and Ingri Butte on Nunivak Island also have relatively large seabird colonies. A few smaller colonies occur at scattered locations along the region's rocky coastline. Seabirds arrive at breeding colonies in April, nest and rear chicks from May through mid August, and continue to occupy the

colonies through September. Some birds may remain in the area until the formation of sea ice forces them to more southerly areas. A large scattered population of gulls and terns also nest in widely-scattered locations along lowland coastal habitat throughout the coastal portion of this Subarea.

Shorebirds (sandpipers, plovers, phalaropes) arrive in the region beginning in mid May, using most of areas identified as concentration areas for waterfowl. They begin nesting on tundra wetland habitat by mid June. Most eggs hatch from late June to mid July. Shorebirds congregate along the barrier islands, coastal lagoons, bays, salt marshes, river deltas, and mudflats from mid July through September to feed before beginning their fall migration in August or September (some may begin their fall migration in July).

(d) Marine Mammals

Polar Bears may occur as far south as St. Matthew Island in the eastern Bering Sea during winter when the seasonal ice front moves southward. In winter, most polar bears are found along the pack ice edge north of the region. During heavy ice years, polar bears have been seen near Nunivak Island. On rare occasions, polar bears may be found along the Yukon River delta coastline during summer.

Seals Four species of seal commonly occur in the nearshore waters of the Western Alaska subarea: ringed seal, bearded seal, harbor seal, and spotted seal. A fifth species, the northern fur seal, may occur in waters surrounding St. Matthew Island during ice-free periods.

Ringed seals are found in subarea waters from September through May. During summer, most ringed seals are found along the edge of the permanent ice pack, although a few may remain in ice-free areas. They return to nearshore areas in late fall and early winter as the shorefast ice reforms in October and November. Most ringed seal pups are born in March or April in birthing lairs constructed on shorefast ice with adequate snow cover. The seal pups remain in the lairs for four to six weeks until they are weaned. Ringed seals molt on shorefast ice and on large flat ice flows in the pack from late March until July, with peak molting occurring in June.

Spotted seals occur in Western Alaska subarea waters year-round. Spotted seals occur at the sea ice-front in winter and have pups, breed, and molt at the ice front. Pupping occurs in April and May. Molting occurs from May until mid July. Spotted seals move toward the coast as the sea ice melts, and feed in nearshore areas and haul out on land during the ice-free months. They move out of the coastal zone when the shorefast ice begins to form.

Spotted seals occur in spring through autumn around St. Matthew Island, Hall Island, and Nunivak Island, and along the coast of the Yukon-Kuskokwim Delta. Main haulout locations are found at St. Matthew Island, Hall Island, and at Scammon Bay. Herring and capelin spawning areas correspond well to major haulout areas. There are no major haulouts along the Yukon River delta, although spotted seals are common there in summer and autumn. They occur in the distributaries of the Yukon River from mid July to early October.

Spotted seals are present along the mainland coast from Kipnuk to the mouths of the Yukon River.. At Tununak and Scammon Bay, spotted seals arrive during the herring runs and remain through the summer. At Hooper Bay, spotted seals are hunted in all months of the year but are taken in greatest abundance July through October.

Spotted seals are present on the ice around Nunivak Island in spring. It is probable that in summer mostly harbor seals are found around the island, whereas in spring and autumn, spotted seals are present. Seals are most abundant at the southwest end of the island near Cape Mendenhall and the northwest end from Cape Mohican to Kigoumiut Bay.

Harbor seals are resident in coastal waters of the southeastern Bering Sea throughout the year. The usual northernmost limit of harbor seals is about Kuskokwim Bay and Nunivak Island; the southernmost limit of spotted seals is about Nanvak Bay. Harbor seals and spotted seals mix in portions of Kuskokwim Bay. Major haulouts occur in Nanvak Bay and in Kuskokwim Bay. Some

pups are born in Nanvak Bay in June and July, but peak numbers of animals occur during the molt in August and September (up to 3,000 seals).

The principal haulouts of spotted/harbor seals in Kuskokwim Bay are on the sandbars off Quinhagak and in the mouth of the Kuskokwim River from May through July. Other haulout areas with smaller numbers of seals from late April to October are at Kongiganak, Chagvan Bay, Goodnews Bay, the Cape Pierce area, Cape Newenham, and Security Cove.

Harbor seals are present year-round on Nunivak and are most common on the northwest end near Cape Mohican and the southeast coast near Cape Mendenhall. There are no confirmed sightings of harbor seals at St. Matthew Island; it is probable that they are occasionally present there in late summer and autumn.

Bearded seals are associated primarily with the pack ice-edge, and in association with leads, flaws, and polynyas. Consequently, they are not found as frequently in nearshore waters as are spotted or harbor seals. Bearded seals occur in the Western Alaska area year-round, and may be found in the lower reaches of the Yukon and Kuskokwim rivers. Pupping occurs from mid March to early May. Molting occurs in May and June.

Ribbon seals are generally found along the Bering Sea ice front from November through mid July. From July through October, ribbon seals do not usually occur in nearshore waters, but frequent ice-free waters of the Bering Sea.

Beluga whales are present along the mainland coast from Kuskokwim Bay to the mouths of the Yukon River from April through November. Belugas are present around Nunivak Island during the ice free months. Belugas have been sighted around St. Matthew Island in April.

Belugas concentrate off the mouths of the Yukon River from May or June to about early October, feeding on salmon, herring, and saffron cod. The earliest sighting off the Yukon River delta was May 20, 1978, near Cape Romanzof and the latest at about freezeup in early to mid November at Hooper Bay. Belugas generally return to wintering areas in the Bering Sea in October and November. Some may winter in the vicinity of St. Matthew Island. Calving may occur in this area during June and July.

Other whales Gray whales are seen from May to July off Capes Peirce and Newenham. They are commonly seen along the southern coast of Nunivak Island in May and June, and occasionally seen on the north and east sides in June. Occasional sightings have been made in Kuskokwim Bay. Gray whales have been seen in June-August near St. Matthew Island and Hall Island. Minke whales and harbor porpoises have been seen off the south and east sides of Nunivak Island. Occasional use of the St. Matthew Island area by northern right whales during the open water period may occur. Harbor porpoises are seen along the south and east sides of Nunivak Island, and occasionally along the coast north of Kuskokwim Bay.

Walrus use haulouts occasionally around Cape Newenham (Cape Peirce to Security Cove) from April to June. Walruses occasionally haulout in Kuskokwim Bay. Walruses haul out on both St. Matthew and Hall Islands in summer and autumn. Virtually all walruses in the found in these areas in summer are males.

Kuskokwim Bay is a major winter concentration area; most walruses arrive in the wintering area from October to December or January. Large numbers of breeding walruses frequently gather on the ice north and west of St. Matthew Island during winter. Walruses, primarily females and juveniles, begin migrating north out of the area in March and April. Calves are born in June.

Steller Sea Lions Generally, sightings of Steller sea lions occur from April through November in the Western Alaska Subarea. It is usually male and subadult Steller sea lions that are found in the Western Alaska subarea haulouts. Steller sea lions haul out on Cape Peirce and Cape Newenham from May to August, and are occasionally seen in Chagvan Bay and Security Cove during this same period. Cape Newenham is a major non breeding haulout in the area. Smaller groups of males regularly haul out on St. Matthew Island, Hall Island, Pinnacle Island, and Nunivak Island

from May through early August. There are no major hauling areas on the mainland coast north of Cape Newenham.

(e) Terrestrial Mammals

Caribou Seven caribou herds use habitat within the Western Alaska subarea: the Mulchatna Herd; the Kilbuck-Kuskokwim Mountains Herd; the Beaver Mountains Herd; the Sunshine Mountain Herd; the Big River Herd (Farewell Herd); the Rainy Pass Herd; and the Tonzona Herd. Calving occurs from mid May to early June. During the peak insect harassment season (mid June to late August), caribou seek insect relief along gravel bars, snow and aufeis fields, glaciers, and on windy mountain slopes and ridges. Summer habitat includes primarily treeless uplands where heath tundra, alpine tundra, and sedge wetlands predominate. Winter habitat includes spruce forests and bog wetlands, ridges, and high plateaus.

Reindeer grazing occurs on Nunivak Island. Reindeer calving occurs in April.

Black Bears are most common in forested river floodplains and lowlands, although they occasionally may occur in alpine areas. Black bears are largely absent from the Yukon - Kuskokwim Delta. Important summer habitats include sedge meadows, and areas of shrubs and forest containing berries. Black bears also may feed at salmon spawning areas. Black bears begin entering dens for the winter in early October and emerge from dens in the spring from mid April through mid May.

Brown Bears (grizzly bears) primarily occur in upland and mountainous areas, but may occur in lowland and coastal areas. Concentrations of bears may be found along rivers when spawning salmon are present; at beached marine mammal carcasses along the coastline, and in caribou calving grounds and migration corridors. Brown bears enter dens from mid October through November and emerge from their dens from early April through late May. Concentrations of bears are attracted to spawning salmon on the lower Goodnews, Eek, Kisaralik, Tuluksak, Aniak, Kogrukluk, Holitna, South Fork Kuskokwim, Andreafsky, East Fork Andreafsky, Atchuelinguk, and Anvik rivers.

Moose occur in habitats throughout the Subarea, ranging from aquatic and riparian floodplain areas to sub-alpine willow-dominated areas. Sedge meadows, ponds and lakes with extensive aquatic vegetation, riparian and subalpine willow stands, and forested areas provide important summer habitat for moose. Important winter habitat includes shrub-dominated alpine and riparian areas, and forested areas. Riparian areas along the major rivers and tributary streams are particularly important during winter. Known winter concentration areas include the mainstem Yukon River and its major tributaries downstream to Mountain Village, and the Kuskokwim River and its major tributaries downstream to Napakiak. The Eek, Holitna, and Hoholitna rivers also support winter concentrations of moose. Calving occurs in late May and early June.

Dall Sheep Within the easternmost portion of the Subarea, Dall sheep are found along Alaska Range headwater drainages, including the Stoney, Big, Swift, South Fork Kuskokwim, and Tonzona rivers. Sheep often are concentrated during winter on windblown slopes and ridges along major river valleys. During summer, sheep disperse to smaller valleys, mountain peaks, and other areas. Mineral licks are important habitat that sheep use primarily from late May through mid July, although sheep may be seen at these sites from April through October. Lambing occurs from mid May through mid June.

Muskoxen Most of the muskoxen in the Western Alaska subarea are found on Nunivak Island. Additional muskoxen occur on Nelson Island and a few are found adjacent favorable areas on the mainland. Riparian vegetation associated with river floodplains and terraces in these drainages, particularly willow thickets during summer, serves as major feeding habitat for muskoxen. Windblown ridges, bluffs, and slopes that remain partially or completely snow-free are preferred habitats in winter and during the calving period (late April to mid June).

Bison The Farewell Herd of bison uses range along the South Fork Kuskokwim River and nearby drainages. In summer bison use bars and islands in rivers and adjacent riparian habitats. Bison winter in uplands and areas where wind frees the area of snow, allowing access to forage.

Wolves and Foxes are found throughout the Western Alaska region. Arctic foxes occupy Nunivak and St. Matthew islands, and coastal areas, whereas red foxes generally occupy inland areas. Some red foxes do occur and den near the coast. Wolves and foxes select den sites where unfrozen, well-drained soils occur (e.g., dunes, river banks, moraines, pingos). Wolves may initiate den construction in mid-April. Pups are born from mid May through early June, and generally leave the den by mid July, although dens may be occupied until August. Arctic and red foxes have a reproductive pattern similar to that of wolves.

Aquatic Furbearers Beaver, mink, muskrat, and river otter are common inhabitants of aquatic and riparian floodplain and wetland areas, including marshes, ponds, lakes, streams, and rivers in the Western Alaska subarea.

2. Vegetation

Rare plant species are identified below, as documented by the Alaska Natural Heritage Program. The map on the following page identifies the general locations of these rare plants. For further information, contact the Alaska Natural Heritage Program botanist at 907-257-2785.

RARE PLANTS KNOWN FROM THE WESTERN ALASKA SUBAREA

Global Rank	State Rank	Scientific Name	Common Name	Federal Status
G3	S3	*Aphragmus Eschscholtzianus*		
G5T2Q	S2	*Arnica Lessingii Ssp Norbergii*	Norberg Arnica	
G4T1T2Q	S1S2	*Artemisia Globularia Var Lutea*		
G5T2T3	S2S3	*Astragalus Harringtonii*		
G4	S3S4	*Astragalus Polaris*	a Milk-vetch	
G4G5	S3S4	*Carex Eleusinoides*	a Sedge	
G4	S2	*Carex Heleonastes*	Hudson Bay Sedge	
G4	S2S3	*Cerastium Regelii*	Regel's Chickweed	
G3G4	S3S4	*Claytonia Scammaniana*	Scamman's Springbeauty	
G5	S2S3	Cryptogramma Stelleri	Slender Cliff-brake	
G2G3	S2S3	*Douglasia Alaskana*	Alaska Rock Jasmine	
G4	S3S4	*Draba Lactea*	Milky Whitlow-grass, Milky Rockcress	
G4G5T	5S3S4	*Eritrichium Aretioides*	Pale Alpine Forget-me-not	
G3	S3	*Festuca Brevissima*		
G4G5Q	S3S4	*Festuca Vivipara*	Viviparous Fescue	
G5T5	S1S2	*Geum Aleppicum Var Strictum*		
G4G5	S2S3	*Oxygraphis Glacialis*		
G4	S3S4	*Oxytropis Mertensiana*	Merten's Crazy-weed	
G3	S3	*Papaver Walpolei*	Walpole Poppy	
G4	S3S4	*Poa Pseudoabbreviata*	Polar Bluegrass	
G3	S3	*Potamogeton Subsibiricus*	Yenisei River Pondweed	
G3	S2S3	*Primula Tschuktschorum*	Chuckchi Primrose	
G2	S2	*Smelowskia Pyriformis*	Pear-fruit Smelowski	
G3Q	S3	*Taraxacum Carneocoloratum*	Pink-flower Dandelion	
G3	S3	*Thlaspi Arcticum*	Arctic Pennycress	
G5	S3	*Zannichellia Palustris*	Horned Pondweed	

Species Ranks used by The Alaska Natural Heritage Program:

Species Global Rankings

G1: Critically imperiled globally. (typically 5 or fewer occurrences)

G2: Imperiled globally. (6-20 occurrences)

G3: Rare or uncommon globally. (21-100 occurrences)

G4: Apparently secure globally, but cause for long-term concern (usually more than 100 occurrences)

G5: Demonstrably secure globally.

G#G#: Rank of species uncertain, best described as a range between the two ranks.

G#Q: Taxonomically questionable.

G#T#: Global rank of species and global rank of the described variety or subspecies of the species.

Species State Rankings

S1: Critically imperiled in state. (usually 5 or fewer occurrences)

S2: Imperiled in state. (6-20 occurrences)

S3: Rare or uncommon in state. (21-100 occurrences)

S4: Apparently secure in state, but with cause for long-term concern (usually more than 100 occurences)

S5: Demonstrably secure in state.

S#S#: State rank of species uncertain, best described as a range between the two ranks.

Insert Known Rare Plan Locations Map here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

3. Biologically Sensitive Areas

The Alaska Department of Fish and Game initiated a project in 1996 to map some of the most environmentally sensitive areas (MESAs) for wildlife along Alaska's coast. This information is for contingency planning purposes and does not cover the complete coastline or sensitive areas that other organizations may identify. Maps entitled "Most Environmentally Sensitive Areas along the Coast of Alaska," were published by the Alaska Department of Fish &Game (1997), and are available in hard copy and digital format from:

Mark Fink
Alaska Department of Fish and Game
Habitat and Restoration Division
Anchorage, Alaska
Phone: 267-2338
FAX: 267-2464

These maps are also available at the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Each of these sensitive areas is plotted on a 1:250,000 scale U.S. Geological Survey quadrangle map. A list of the sensitive areas in the Western Alaska Subarea and map referencing their location is provided (see the following figure and table, followed by the maps).

Most Environmentally Sensitive Areas
("Biological Hotspots")
Pastol Bay to Cape Pierce

12. Mouth of the Yukon River
    - salmon concentrations
    - waterfowl molting and fall staging
    - beluga whales nearshore
    - Yukon-Kuskokwim Delta National Wildlife Refuge

13. Mouth and Lower Kuskokwim River
    - salmon concentrations
    - waterfowl spring and fall staging and molting
    - Yukon-Kuskokwim Delta National Wildlife Refuge

14. Goodnews Bay
    - salmon concentrations
    - herring spawning
    - waterfowl spring and fall staging
    - seabird colonies (350 birds)
    - eelgrass beds

15. Saint Matthew Island
    - seabird colonies (>2.2 million birds)
    - walrus haulouts
    - Alaska Maritime National Wildlife Refuge

16. Chagvan Bay (just north of Cape Newenham)
    - salmon concentrations
    - herring spawning
    - waterfowl spring and fall staging and molting
    - eelgrass beds
    - Cape Newenham State Game Refuge
    - Togiak National Wildlife Refuge

17. Cape Newenham/Cape Pierce
    - herring spawning
    - waterfowl spring and fall staging and winter concentrations
    - seabird colonies (>607,000 birds)
    - harbor seal haulouts
    - sea lion haulouts
    - walrus haulouts
    - gray whales nearshore
    - Togiak National Wildlife Refuge

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Insert MESA Index Map, Volume I (Arctic, Western, and Southwest Alaska) here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 12, Mouth of the Yukon River here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 13, Mouth and Lower Kuskokwim River here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 14, Goodnews Bay here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 15, Saint Matthew Island here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 16, Chagvan Bay (just north of Cape Newenham) here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

Insert MESA Map 17, Cape Newenham to Cape Pierce here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

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D. HUMAN USE RESOURCES

1. Fish Hatcheries and Associated Ocean Net Pens

There are no hatcheries or pens operating in the Western Alaska Subarea.

2. Aquaculture Sites

There are no aquaculture sites in the Western Alaska Subarea.

3. Cultural Resources

The Western Alaska Subarea contains a multitude of known and unidentified archaeological and historic sites. Oil spills and hazardous substance releases may result in direct and/or indirect impacts to those cultural resources. Federal On-Scene Coordinators are responsible for ensuring that response actions take the protection of cultural resources into account and that the statutory requirements for protecting cultural resources are met. Annex M of the Unified Plan outlines Federal On-Scene Coordinators responsibilities for protecting cultural resources and provides an expedited process for compliance with Section 106 of the National Historic Preservation Act during the emergency phase of a response.

4. Subsistence and Personal Use Harvest

Subsistence-related uses of natural resources play an important role in the economy and culture of many communities in the Western Alaska Subarea. A subsistence economy may be defined as follows:

> ...an economy in which the customary and traditional uses of fish, wildlife and plant resources contribute substantially to the social, cultural and economic welfare of families in the form of food, clothing, transportation and handicrafts. Sharing of resources, kinship-based production, small scale technology and the dissemination of information about subsistence across generational lines are additional characteristics.

Before 1990, the State of Alaska made all decisions regarding the management of fish and wildlife resources and harvest allocations. In 1990, however, the Federal government became responsible for managing subsistence resources on Federal public lands and in 1999 in Federal reserved waters. The Federal Subsistence Board adopts subsistence regulations which are administered by the various Federal agencies on Federal public lands. State regulations still apply on all lands, and the State is still the manager of fish and wildlife on all lands and waters in Alaska. As a consequence, the number of agencies involved in managing subsistence uses has increased. Therefore, in the event of a spill, extensive coordination will be required in order to address subsistence resources. Regulations regarding subsistence harvest can also be expected to undergo further regular modification. Current information on harvest regulations can be obtained from the Alaska Department of Fish and Game, Subsistence Division at Anchorage: 267-2353; and from the U.S. Fish and Wildlife Service, Office of Subsistence Management at Anchorage: 786-3888.

Local communities can provide the most detailed and accurate information regarding current subsistence and personal use harvest. Contacts for potentially affected communities are identified in the Response Section, Part One.

5. Commercial Fishing

Commercial fishing in the Western Alaska subarea focuses primarily on salmon and herring. Herring fishing occurs in May and the first part of June. Fishing periods are opened and closed by emergency orders by the Alaska Department of Fish and Game.

Commercial salmon fishing (set gill nets and drift nets) within the Western Alaska subarea is also regulated by emergency orders by the Alaska Department of Fish and Game. Fishing periods within the Kuskokwim Bay, and the mainstream portions of the Kuskokwim and Yukon Rivers within the Western Alaska subarea generally occur from early June through August. The upstream limit for commercial salmon fishing on the Kuskokwim River is approximately Chuathbaluk. Contact the Alaska Department of Fish and Game for information regarding commercial and subsistence salmon fishing periods within the Yukon River drainage. Contact the Alaska Department of Fish and Game, Bethel (543-2433), for information regarding commercial and subsistence salmon fishing periods within the Kuskokwim River drainage; and Anchorage (267-2109) for the Yukon River drainage.

6. Sport Fishing and Hunting

Sport fishing and hunting occurs at a wide variety of locations in the Western Alaska subarea throughout the year. Seasons and harvest regulations vary depending on the species and the area, and may be changed from year to year. Contact the Alaska Department of Fish and Game for current seasons within the area of the spill.

7. Recreational Sites and Facilities

TO BE DEVELOPED

8. Commercial Tourism

The travel to the Western Alaska subarea is dictated by seasonal changes and should be noted that the majority of the tourism occurs in the summer months. For additional information contact:

Alaska Division of Tourism	465-2012
Alaska State Chamber of Commerce	586-2323
Alaska Native Tourism Council	274-5400
Alaska Wilderness Recreation & Tourism Assoc.	463-3038

9. Marinas and Ports

(See the Resources Section)

10. Fish Processing

Fish processing (salmon) within the Western Alaska subarea occurs onshore at Emmonak and Anvik within the Yukon River drainage. Within the Kuskokwim River drainage, salmon processing occurs at Bethel and to a limited extent Akiachak. An inoperative facility is at Aniak and the processing facility at Quinhagak provides only ice. The communities of Toksook Bay. Mekoryuk, and Tununak process halibut. Herring is processed on floating processors.

11. Logging Facilities

There are no known commercial logging activities in the Western Alaska subarea.

12. Water Intake/Use

The following information was generated by the Alaska Department of Environmental Conservation, Drinking Water and Water Treatment Section. Included are active, permitted public water use facilities by index number, facility name, and facility location. For further information contact Alaska Department of Environmental Conservation, Anchorage office, at 907-269-7624.

Name of Facility	Location	State ID #	Source
Napakiak Water System	Napakiak	260121	Groundwater
LKSD Napakiak HS & Elem.	Napakiak	271253	Groundwater
Napakiak W.S. Central Well	Napakiak	262319	Groundwater
Napakiak Well #3 Hud Well	Napakiak	263002	Groundwater
Napaskiak East Water Point	Napaskiak	271952	Groundwater
LKSD Napaskiak Z J Williams	Napaskiak	270980	Groundwater
Napaskiak Water System	Napaskiak	260139	Groundwater
LKSD Nunapitchuk Elem.	Nunapitchuk	260155	Groundwater
Nunapitchuk Water System	Nunapitchuk	260820	Groundwater
LYSD Pilot Station High School	Pilot Station	271415	Groundwater
Pilot Station Water System (2)	Pilot Station	260163	Groundwater
USAF Cape Newenham	Cape Newenham	260480	Surface
LKSD Kwethluk Housing	Kwethluk	270647	Groundwater
LKSD Kwethluk HS and Elem.	Kwethluk	270956	Groundwater
Kwethluk Washeteria	Kwethluk	261371	Groundwater
Oscarville Watering Point	Oscarville	270061	Groundwater
Mountain Village Water System (4)	Mountain Village	270150	Groundwater
Russian Mission Water System	Russian Mission	270168	Groundwater
Saint Mary's Water System	Andrefsky	270176	Groundwater
Scammon Bay Water System	Scammon Bay	270184	Groundwater
Sheldon Point Water System	Sheldon Point	270207	Surface
Toksook Bay Water Syestem	Toksook Bay	270215	Groundwater
Tuluksak Water System	Tuluksak	270223	Groundwater
LKSD Tununak Paul Albert HS	Tununak	270613	Groundwater
Kasigluk Washeteria	Kasigluk	270794	Groundwater
LKSD Kasigluk Akula HS & Elem	Kasigluk	270948	Groundwater
LKSD Akiuk Kasigluk Plant Fac	Kasigluk	270621	Groundwater
Tununak Water System	Tununak	270231	Surface
LKSD Goodnews Bay Rocky MTN	Goodnews Bay	270930	Groundwater
Goodnews Bay	Goodnews Bay	270257	Groundwater
City of Marshall (3)	Marshall	270273	Groundwater
Eek Water System	Eek	270281	Surface
Emmonak Water System	Emmonak	270299	Surface
LYSD Hooper Bay School	Hooper Bay	270540	Groundwater
Hooper Bay Washeteria	Hooper Bay	271279	Groundwater
Hooper Bay Old Town Site #1	Hooper Bay	270312	Groundwater
Kashunamiut SD Chevak School	Chevak	270582	Groundwater
Chevak Water System	Chevak Village	270320	Groundwater
LKSD Chefornak Amakigchuk TC	Chefornak	270590	Groundwater
Chefornak Water System	Chefornak	270338	Groundwater
Alakanuk Water System	Alakanuk	270362	Surface
State of AK Aniak AST	Aniak	270651	Groundwater
Aniak Lodge	Aniak	270809	Groundwater
A & G Acre Plus	Aniak	271287	Groundwater
Anyaraqmuite Office Building	Aniak	271554	Groundwater
Sackett Center	Aniak	271643	Groundwater
Hound House	Aniak	271978	Groundwater
Alaska Pacific Caviar	Aniak	271774	Groundwater
YKHC Aniak Subregional Clinic	Aniak	271928	Groundwater
FAA Aniak Facility	Aniak	270388	Groundwater
Bethel Heights Water System	Bethel Heights	270346	Groundwater

Northern Lights Water	Bethel	271979	Groundwater
Alaska Airlines	Bethel	271980	Groundwater/Purchased
Pacifica House & Diane's Restaurant	Bethel	271982	Groundwater
Nunapitchuk Apartments	Bethel	271588	Groundwater
YKHC Hospital 800 Bldg	Bethel	271300	Groundwater
U.S. Army National Guard	Bethel	270419	Groundwater
Shea Apartments	Bethel	271782	Groundwater
Brass Buckle Roadhouse	Bethel	271790	Groundwater
Kreiders Water Service/Water Haulers	Bethel	271830	Groundwater/Purchased
City of Bethel (8)	Bethel	271848	Groundwater/Purchased
Bethel Native Corporation	Bethel	270469	Groundwater
LKSD Kilbuck Elementary	Bethel	270493	Groundwater
Bethel Water Complex	Bethel	271075	Groundwater
YKHC Hospital (2)	Bethel	271083	Groundwater
Bethel Community Services	Bethel	271091	Groundwater
Bethel Native Corp. Offices	Bethel	271106	Groundwater
Tundra Women's Coalition	Bethel	271114	Groundwater
Bethel Trailer Court (3)	Bethel	271148	Groundwater
Bautista House	Bethel	271156	Groundwater
Timberline Apts.	Bethel	271164	Groundwater
Lakeview Apt Water System	Bethel	271172	Groundwater
Inlet Fish Producers	Bethel	270524	Groundwater
Tundra Center Water System	Bethel	271473	Groundwater
SOA Bethel Trooper Bldg	Bethel	271740	Groundwater
Yukon Kuskokwim Correctional Fac	Bethel	271334	Groundwater
Bethel Youth Facility	Bethel	271889	Groundwater/Purchased
Swanson's Store	Bethel	271902	Groundwater
Bethel Utilities Well #1	Bethel	271936	Groundwater
USFWS Yukon Delta NWR Hdqtrs	Bethel	271538	Groundwater
Tuntutuliak Washeteria	Tuntutuliak	271211	Groundwater
LKSD Tuntutuliak Angapak SC	Tuntutuliak	271017	Groundwater
Lower Kalskag Water System	Lower Kalskag	270697	Groundwater
KSD George Morgan HS	Kalskag	270833	Groundwater
Newtok Water System	Newtok	271431	Surface
LKSD Newtok Ayaprun Elementary	Newtok	270710	Groundwater
LKSD Kipnuk HS	Kipnuk	270728	Surface
Kipnuk Water System	Kipnuk	270736	Surface
LKSD Oscarville HS and Elem.	Oscarville	270744	Groundwater
Quinhagak Water System	Quinhagak	271041	Surface
LKSD Quinhagak & Teacher Hsng	Quinhagak	270752	Surface/Purchased
Akiakchak Water System	Akiachak	270786	Groundwater
Sleetmute Watering Point	Sleetmute	271874	Groundwater
Sleetmute Well and Washeteria	Sleetmute	270825	Groundwater
SOA Employee Housing	McGrath	270891	Groundwater
McGrath Water System	McGrath	280155	Surface
IASD Takotna School	McGrath	280252	Groundwater
IASD Telida School	McGrath	280260	Groundwater
Kwigillinok Washeteria	Kwigillinok	271700	Surface
LKSD Kwigillinok HS and Elem.	Kwigillinok	270964	Surface
Mekoryuk Washeteria	Mekoryuk	271562	Surface
LKSD Mekoryuk Nunivaarmiut	Mekoryuk	270972	Groundwater
LKSD Kongiganak HS & Elem.	Kongiganak	271245	Surface
Kongiganak Water System	Kongiganak	271025	Surface
Atmautlak Water System	Atmautlak	271033	Groundwater
Platinum City Water System	Platinum	271059	Groundwater
LKSD Nightmute HS & Elem.	Nightmute	271261	Groundwater
Kotlik Washeteria	Kotlik	271342	Surface
LYSD Kotlik Community System	Kotlik	271407	Surface
Akiak Community Water System	Akiak	271520	Groundwater

E. ICE, WIND AND CURRENTS

The following is an overview of wind, tide, ice and current conditions in the Bering Sea and Kuskokwim Bay . Much of the available data is general in nature and should be supplemented by area-specific updates and any information available from local residents. Included herein are wind data, tidal ranges, data on a variety of ice conditions and maps of net surface currents. Using the current edition of the U.S. Department of Commerce National Oceanic and Atmospheric Administration tide current tables for the Pacific coast of North America, it is possible to predict the times of ebb and flood tides for points within this region.

1. Sea Ice Conditions

Sea ice generally forms off the Yukon River beginning in mid October. Between mid December and mid April, sea ice coverage ranges from 70 to 100 percent. Shorefast ice reaches offshore from 15 to 60 km. In deeper waters beyond the shorefast ice, sea ice persists until April or May. By mid June or by early July, the delta area is ice free.

An estimated 97% of the ice in the Bering Sea is formed within the Bering Sea; very little is transported south through the Bering Strait. During periods of increasing ice and prevailing northerly winds, the ice apparently is generated along the south-facing coasts of the Bering Sea and moves southward with the wind at as much as 1 knot before melting at its southern limit. During periods of southerly winds, ice coverage generally decreases in the Bering, causing a wide variation in ice cover from month to month and year to year.

In the Bering Sea a wind-induced polynya immediately south of St Lawrence island is a frequent but undependable feature. Northerly winds cause the polynya to form in the lee of the island as sea ice is advected to the south. A polynya can form on any side of Nunivak Island, depending upon prevailing wind direction. Usually the feature is located to the north or south, under southerly or northerly winds, respectively. Like the polynya off St. Lawrence Island, the appearance of this polynya is variable, but it is usually observed at least once a year, often more. Its extent is variable, and thin ice commonly covers the polynya quickly during cold, northerly wind storms.

2. Current Data

Tides in the Bering Sea are considered to be the result of cooscilation with large oceans. Once inside the Bering Sea. Each tidal constituent propagates rapidly as a free wave subject to the Coriolis effect and bottom friction. The tide wave propagates rapidly across the deep western basin. Part of it then propagates onto the southeast Bering shelf where large amplitudes are found along the Alaska Peninsula and in Kvichak and Kuskokwim Bays. Circulation in the northern Bering Sea and near the Yukon River Delta, is dominated by a northward mean flow paralleling the local bathymetry.

Average Arctic Marine Breakup and Freezeup Dates

Location	Avg. Breakup Date	Avg. Freezeup Date	Avg. Years Record
Platinum/Goodnews Bay	May 1	November 19	
St Michael	June 9	November 10	
Akulurak	May 27	October 24	
Hamilton	May 22	October 25	
Azacharak	May 20	November 13	
Pilot Station	May 17	November 8	
Russian Mission	May 12	November 4	
Holy Cross	May 17	October 31	
Hooper Bay	May 26	November 12	
Mekoryuk	May 12	November 27	
Bethel	May 15	October 29	
Quinhagak	May 1	November 19	

Source: AEIDC. 1983. AEIDC 1975. ADF&G 1986a US Coast Pilot #9, 1/83

3. Tidal Ranges

Tides in the Yukon River delta area exhibit a high degree of spatial variability in amplitude and phase because of the delta's complex topography. The tides are a mixture of diurnal and semi-diurnal tides depending on the location and time of year. The diurnal tidal range at the face of the delta is about 1 to 2 m. Storm surges may occur in the area during the ice-free period, particularly during autumn.

4. Winds

In many cases, spill trajectory is determined primarily by winds, especially when currents are weak Throughout the Bering the wind is fairly strong year-round but blows the hardest in winter. Prevailing summer winds blow from the south or southwest at 7 to 10 knots. Winter winds generally come from the east or northeast at 10 to 15 knots, and can persist in one direction for weeks at a time causing a wide variety of water and ice movement. Winds are usually stronger at St. Lawrence Island (averaging 15.5 knots) than along the mainland. Maximum recorded sustained wind speed at Nome is 78 knots and 92 knots at Unalakleet.

5. Spill Trajectory Modeling

The behavior of spilled oil on water is the result of the complex interaction of the forces described above. Accordingly, trajectory modeling can be difficult. The National Oceanic and Atmospheric Administration is capable of generating computerized spill trajectory forecasts. Requests for this service should be directed to:

John Whitney
Scientific Support Coordinator
National Oceanic and Atmospheric Administration
Anchorage, Alaska

working hours: 271-3593
fax: 271-3139
after hours: 346-1634
beeper: 275-3134

5. Data Sources

Hood and Zimmerman (eds). Gulf of Alaska: Physical Environment and Biological Resource. (Gulf of Alaska net surface currents)

LaBelle, J.C. and J.L. Wise. 1983. Alaska Marine Ice Atlas.

National Climatic Data Center and Arctic Environmental Information and Data Center (AEIDC). 1988. Climatic Atlas, Volume II: Bering Sea. (wind roses, tidal range data and map)

Thorsteinson, L.K., P.R. Becker, and D. A. Hale. 1989. The Yukon Delta: a synthesis of information. Outer Continental Shelf Environmental Assessment Program. OCS Study MMS 89-0081. USDC:NOAA and USDI:MMS. Anchorage, Alaska. 89 pp.

U.S. Department of Commerce National Oceanic And Atmospheric Administration. 1989. Tide Current Tables 1990: Pacific Coast of North America and Asia. (tidal current data and information)

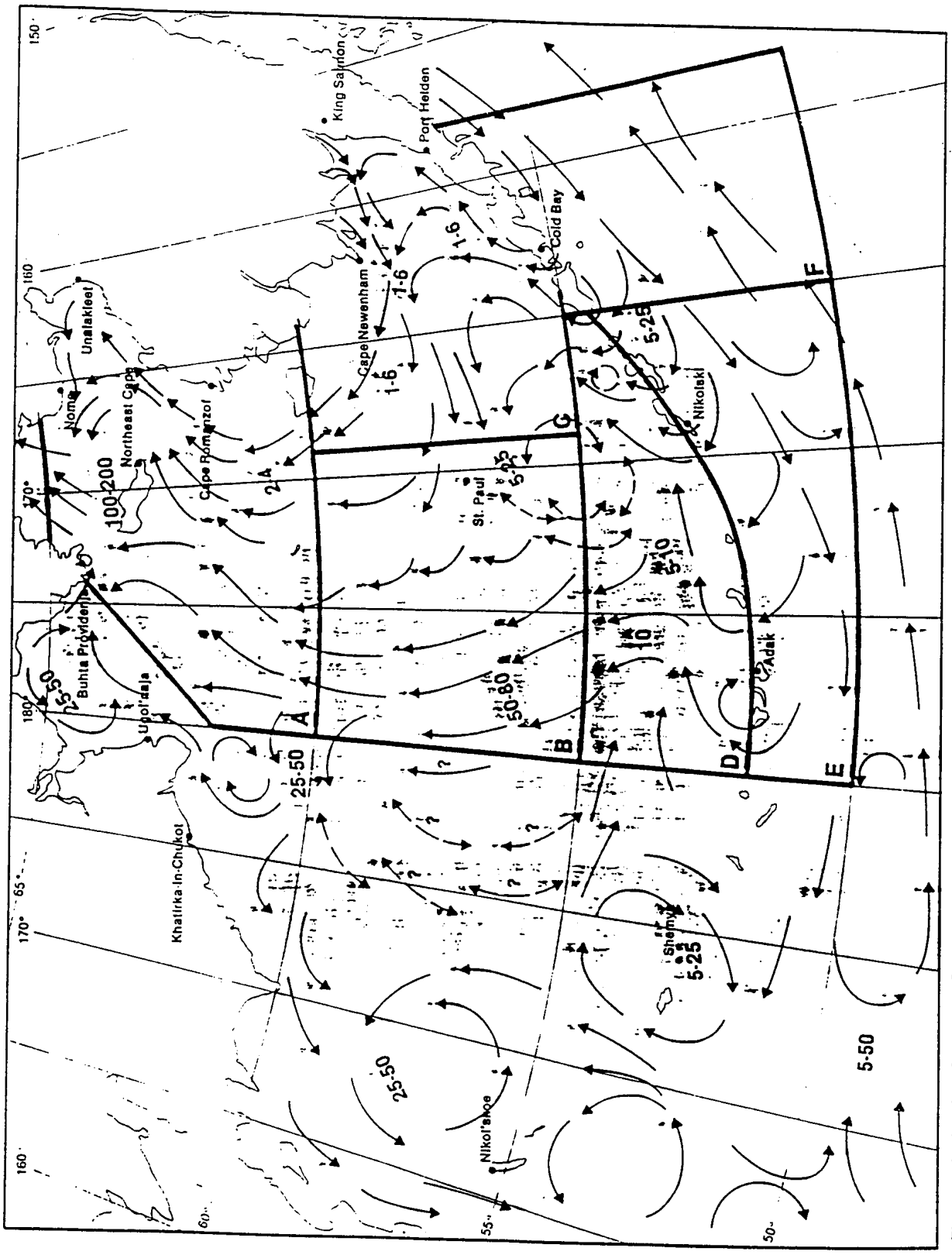
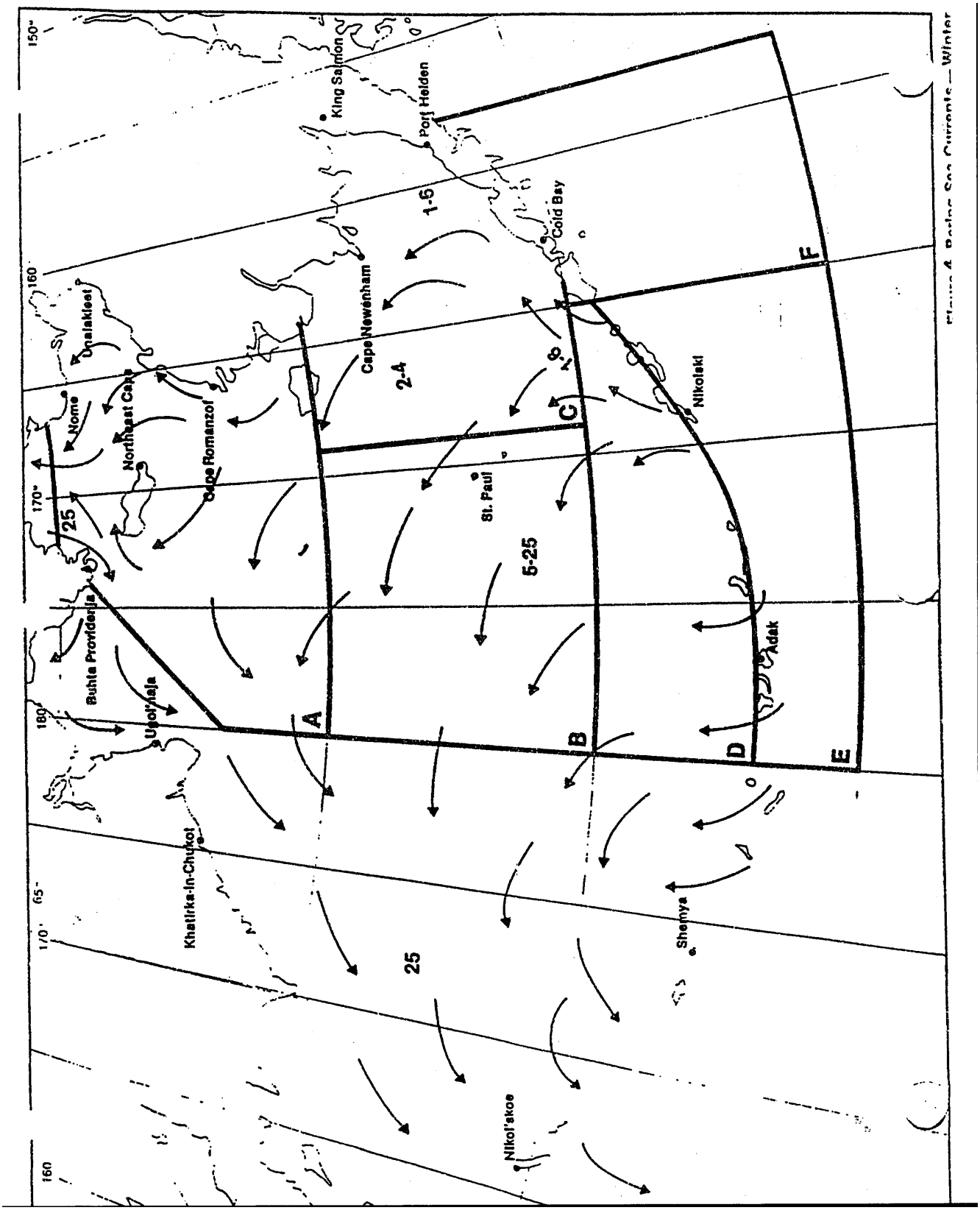


Figure 4. Bering Sea Currents—Summer


King Salmon
Port Heiden
Cold Bay
Unalakleet
Nome
Northeast Cape
Cape Romanzof
Cape Newenham
Nikolski
St. Paul
Adak
Bushia Providenija
Ugol'naja
Khatirka-In-Chukot
Shemya
Nikol'skoe
A
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C
D
E
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1-5
2-4
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25

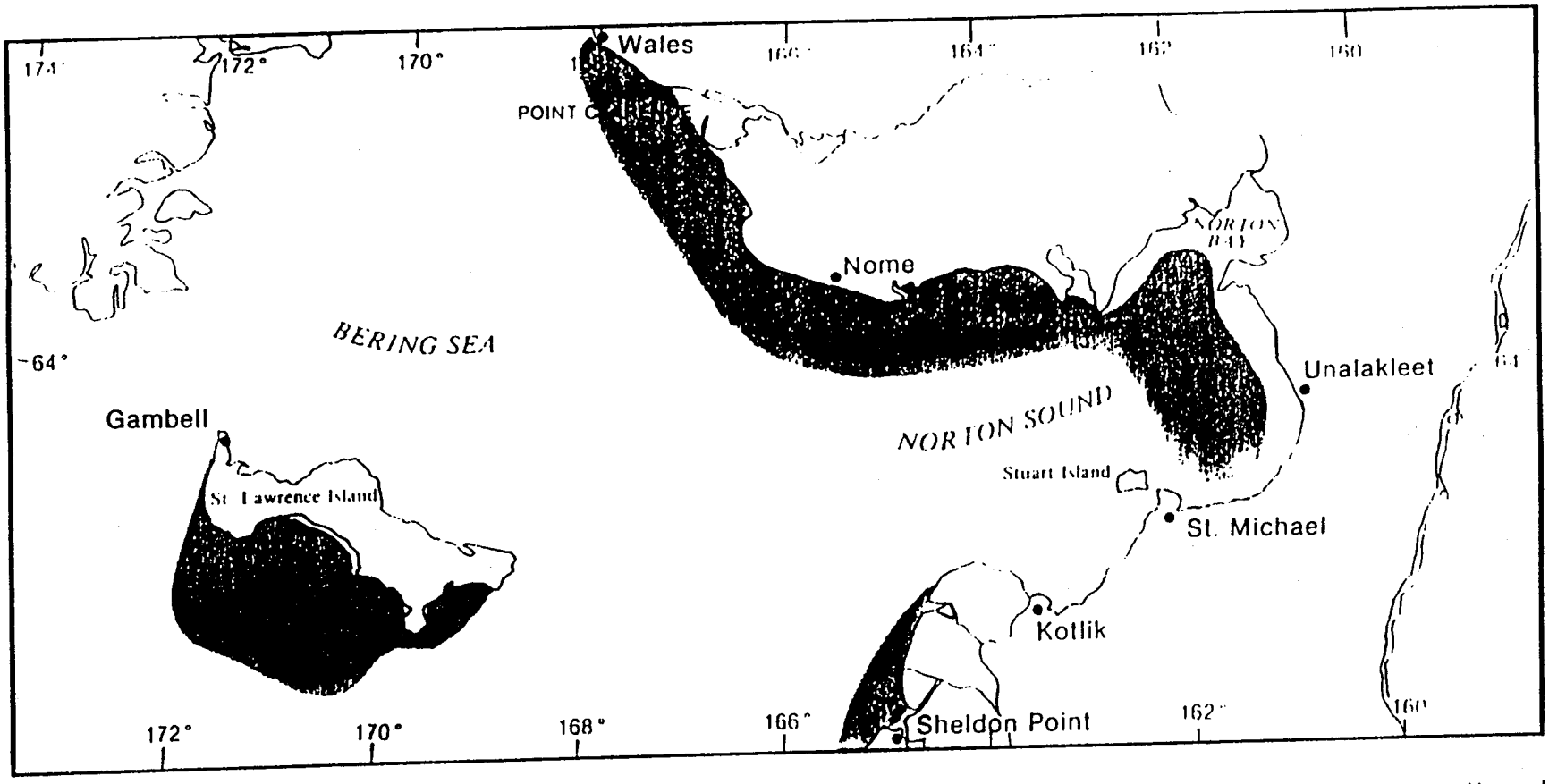

Figure 6. Recurring Polynyas

Synthesized from: McNutt 1981; Stringer, Barrett, and Schreurs 1980; Wohl 1982.

SENSITIVE AREAS: PART FIVE - SIGNIFICANT DATA GAPS AND INFORMATION NEEDS

(a) Detailed information on Steller's Sea Lion

(b) Detailed information regarding subsistence use areas

(c) More local areas of concern

(d) Site-specific geographic response plans around high-risk areas

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SENSITIVE AREAS: PART SIX - KEY REFERENCES

The following documents will provide information on critical fish and wildlife concentrations and human uses. The information contained in these documents is not, for the most part, duplicated in this contingency plan. Also identified are Geographic Information System (GIS) databases which may have automated resources information for the area.

Documents:

Alaska Clean Seas. 1987. Alaskan Bering Sea Coastal Resources Manual, Norton Sound Region. ACS spill contingency planning manual. Anchorage.

Alaska Department of Environmental Conservation. 1998. Water Permit Database.

Alaska Department of Fish and Game. 1992. An Atlas to the Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes, Western Region.

Alaska Department of Fish and Game. 1986a. Alaska Habitat Management Guide. Distribution, Abundance, and Human Use of Fish and Wildlife. Western and Interior Region. Division of Habitat, Juneau. 854 pp.

Alaska Department of Fish and Game. 1986b. Alaska Habitat Management Guide. Life Histories and Habitat Requirements of Fish and Wildlife. Division of Habitat, Juneau. 763 pp.

Alaska Department of Fish and Game. 1986c. Alaska Habitat Management Guide. Map Atlas. Western and Interior Region. Division of Habitat, Juneau. 7 pp. + 22 plates.

Alaska Department of Natural Resources and Alaska Department of Fish and Game. 1987. Fish and wildlife element. Kuskokwim Area Plan. ADNR and ADF&G, Anchorage. 171 pp.

Amstrup, S.C. and D.P. DeMaster. 1988. Polar bear, *Ursus maritimus*. Pages 39-56 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington, D.C. 275 pp.

Cenaliulriit Coastal Resource Service Area. 1999. Revised coastal Management Plan.

Chapman, J.A., and G.A. Feldhamer, eds. 1982. Wild mammals of North America. Johns Hopkins University Press, Baltimore and London. 1147 pp.

Francisco, R.K., C. Anderson, C. Burkey Jr., M. Coffing, K. Hyer, D.B. Molyneaux, and C. Utermohle. 1992. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area, 1991. ADF&G Regional Information Rept. No. 3A92-06. ADF&G, Anchorage. 212 pp.

Frost, K.J., and L.F. Lowry. 1988. Marine mammals. Pages 85-101 *in* M.J. Hameedi and A.S. Naidu, eds. The environment and resources of the Chukchi Sea: A review of scientific literature. Outer Continental Shelf Environmental southeastern Assessment Program. USDC and USDI, OCS Study, MMS 87-0113. 103 pp.

Frost, K.J., L.F. Lowry, and J.J. Burns. 1983. Distribution of marine mammals in the coastal zone of the Bering Sea during summer and autumn. Outer Continental Shelf Environmental Assessment Program Final Report 20:365-562. USDC:NOAA. Juneau, Alaska.

Hazard, K. 1988. Beluga whale, *Delphinapterus leucas*. Pages 195-235 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington D.C. 275 pp.

Kelly, B.P. 1988. Bearded Seal, E*rignathus barbatus*. Pages 77-94 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington D.C. 275 pp.

Kelly, B.P. 1988. Ringed Seal, *Phoca hispida*. Pages 57-75 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington D.C. 275 pp.

Michel, J., J. Halls, S. Zengel, J. Dahlin, and J. Petersen. 1997. Environmental Sensitivity Index Guidelines Version 2.0. National Oceanic and Atmospheric Administration Technical Memorandum NOS ORCA 115.

Minerals Management Service. 1992. Shipwrecks of the Alaskan Shelf and Shore. U.S. Department of the Interior.

Minerals Management Service. 1996. Outer continental shelf oil and gas leasing program: 1997-2002. Draft environmental impact statement. Vol. 1. OCS EIS/EA MMS 95-0061. USDI:MMS.

National Climatic Data Center (NDC) and Arctic Environmental Information and Data Center (AEIDC). 1988. Climatic Atlas, Volume II: Bering Sea.

Quakenbush, L.T. 1988. Spotted seal, *Phoca largha*. Pages 107-124 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington D.C. 275 pp.

Roseneau, D.G., and D.H. Herter. 1984. Marine and coastal birds. Pages 80-115 *in* J.C. Truett, ed. Proceedings of a synthesis meeting: the Barrow Arch environment and possible consequences of planned offshore oil development. Outer Continental Shelf Environmental Assessment Program. USDC: NOAA and USDI, MMS. Anchorage, Alaska. 229 pp.

Sease, J.L. and D.G. Chapman. 1988. Pacific walrus, *Odobenus rosmarus divergens*. Pages 17-38 *in* J.W. Lentfer, ed. Selected marine mammals of Alaska: Species accounts with research and management recommendations. Marine Mammal Commission, Washington D.C. 275 pp.

U.S. Fish and Wildlife Service. 1986. Togiak National Wildlife Refuge Final Comprehensive Conservation Plan, Wilderness Review and Environmental Impact Statement. USDI:USFWS. Anchorage, Alaska. 514 pp.

U.S. Fish and Wildlife Service. 1988. Yukon Delta National Wildlife Refuge final comprehensive conservation plan, environmental impact statement, wilderness review, and wild river plan. USDI:USFWS. Anchorage, Alaska. 543 pp.

U.S. Fish and Wildlife Service. 1990. Togiak National Wildlife Refuge fisheries management plan, FY 1990-1994. USDI:USFWS. King Salmon and Dillingham, Alaska 80 pp.

U.S. Fish and Wildlife Service. 1991. Yukon Delta National Wildlife Refuge fisheries management plan, FY 1992-1996. USDI:USFWS. Kenai, Alaska. 151 pp.

U.S. Fish and Wildlife Service. 1998. Alaska Seabird Colony Catalog

Geographic Information System (GIS) Databases

Alaska Department of Natural Resources: Rich McMahon, Anchorage, 269-8836
National Park Service: George Dickison, Anchorage, 257-2489
U.S. Fish and Wildlife Service: Catherine Berg, Anchorage, 786-3598
National Oceanic and Atmospheric Administration: John Whitney, Anchorage, 271-3593
Bureau of Land Management: Paula Krebs, Anchorage, 271-4540

SENSITIVE AREAS: PART SEVEN - AREAS OF LOCAL CONCERN

An August 2000 Federal/State joint survey of Native tribes in the yielded additional information about sensitive areas near villages, as viewed from the local perspective. The tribes responding to the survey, their top five sites of concern, and the reason for their importance, is presented below.

Oscarville Tribal Council

Oscarville Slough	Whitefish
Kuskokwim River	Seasonal subsistence use
Island near Oscarville	Watefowl nest and summer camp for village

Newtok Traditional Council

School	Children
Houses	Family & children
Local store	Food
River	Access to subsistence
Church	Worship

Native Village of Nightmute

Nightmute High school	Children
Toksook River	Subsistence fishing
Nightmute spring waters	Drinking water
Tundra, ponds, rivers	Waterfowl, land birds, plants (subsistence)
Nightmute public places	Clinic, post office, work office

Native Village of Kwinhagak

School	Educational facility
Clinic/washeteria	Health facility
Stores (2)	Food, clothing
Fish plant	Jobs for Villagers
Airport	Transportation facility

Pitka's Point Traditional Council

Infiltration gallery	Drinking water
Yukon River	Subsistence use
Anreafski River	Subsistence use
Tundra around community	Subsistence use

Native Village of Algaaciq

Water source	Community drining water
Andreafski River	Subsistence use
High school	Public school
Gas station	Fuel storage area
River gas station	Gas station near river

Native Village of Scammon Bay

Fishing places in the river	Subsistence fishing

Nunakauyak Traditional Council

Southside Pond	Adjacent to bay
Southside Bay	Tank farm less that 10 from Bay

Native Village of Tuntutuliak

Tagyaraq River	Subsistence use
Kialiq River & sources	Subsistence use
Qiniaq River	Subsistence use
LAMS	School

Tununak IRA Council

Tununak Bay	Subsistence use
Tununak River	Subsistence use
Tununak oil & fuel tanks	Quality of air

SENSITIVE AREAS: ATTACHMENT ONE

ALASKA DEPARTMENT OF FISH AND GAME

Subsistence and Personal Use Harvests

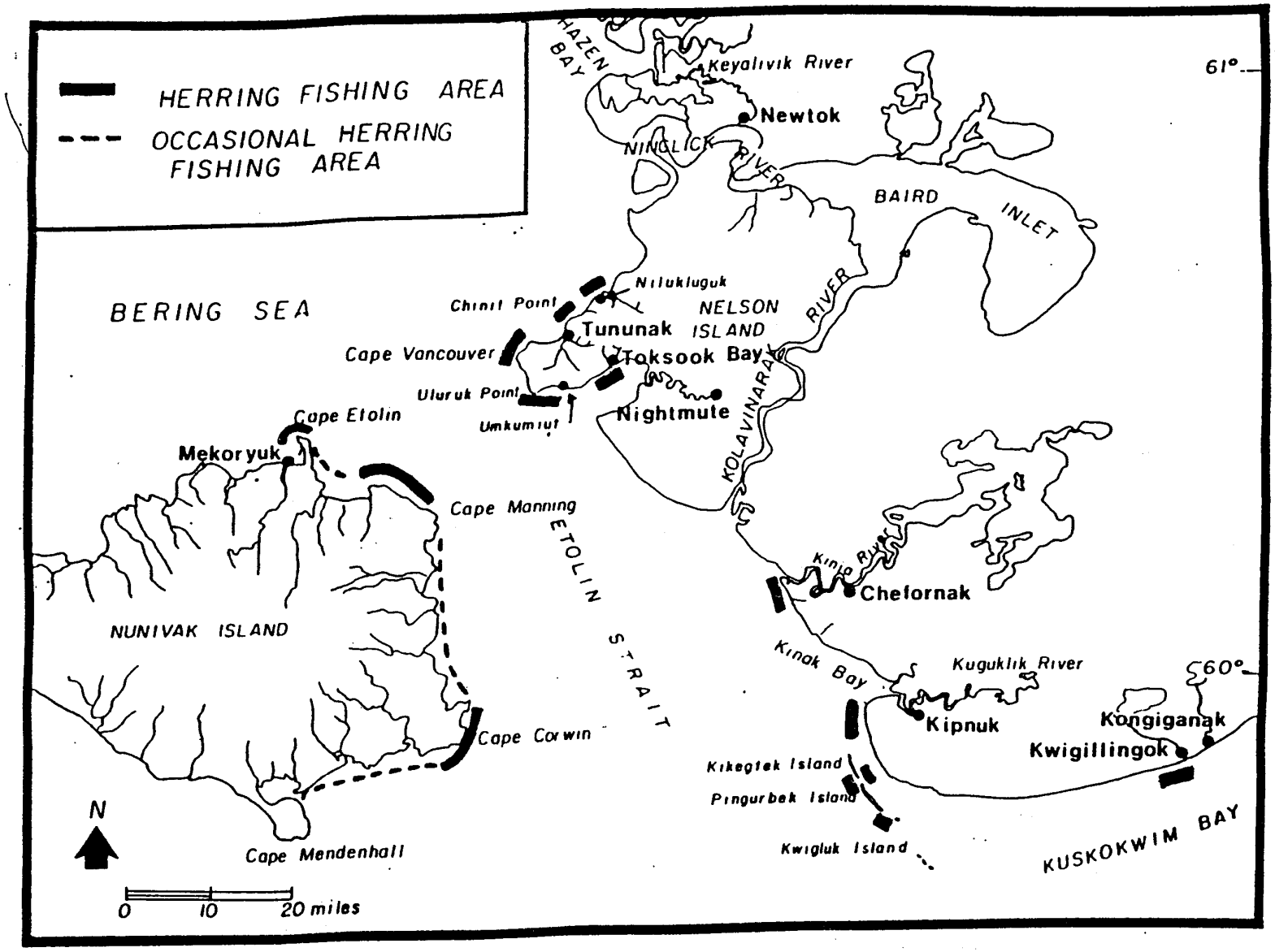
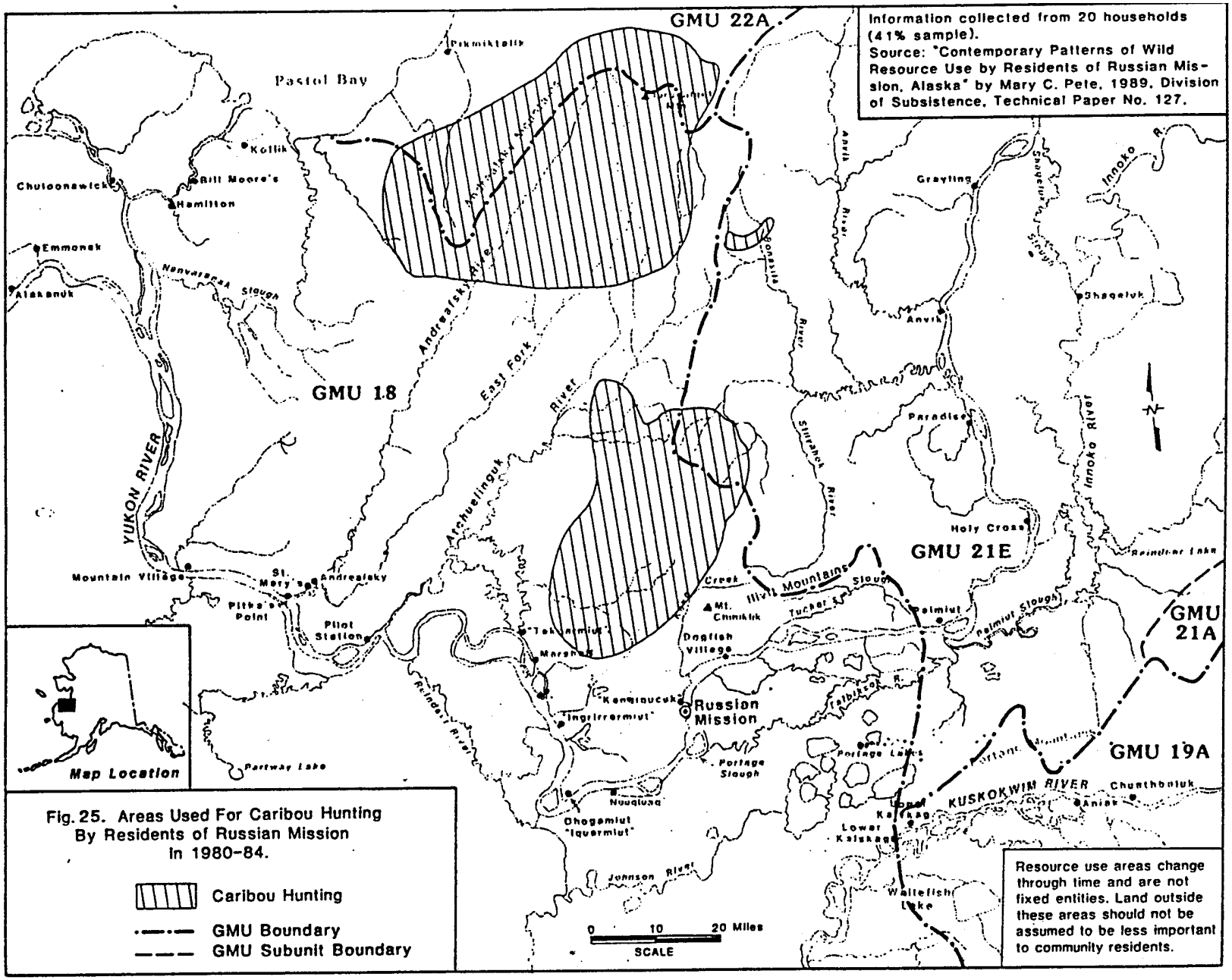
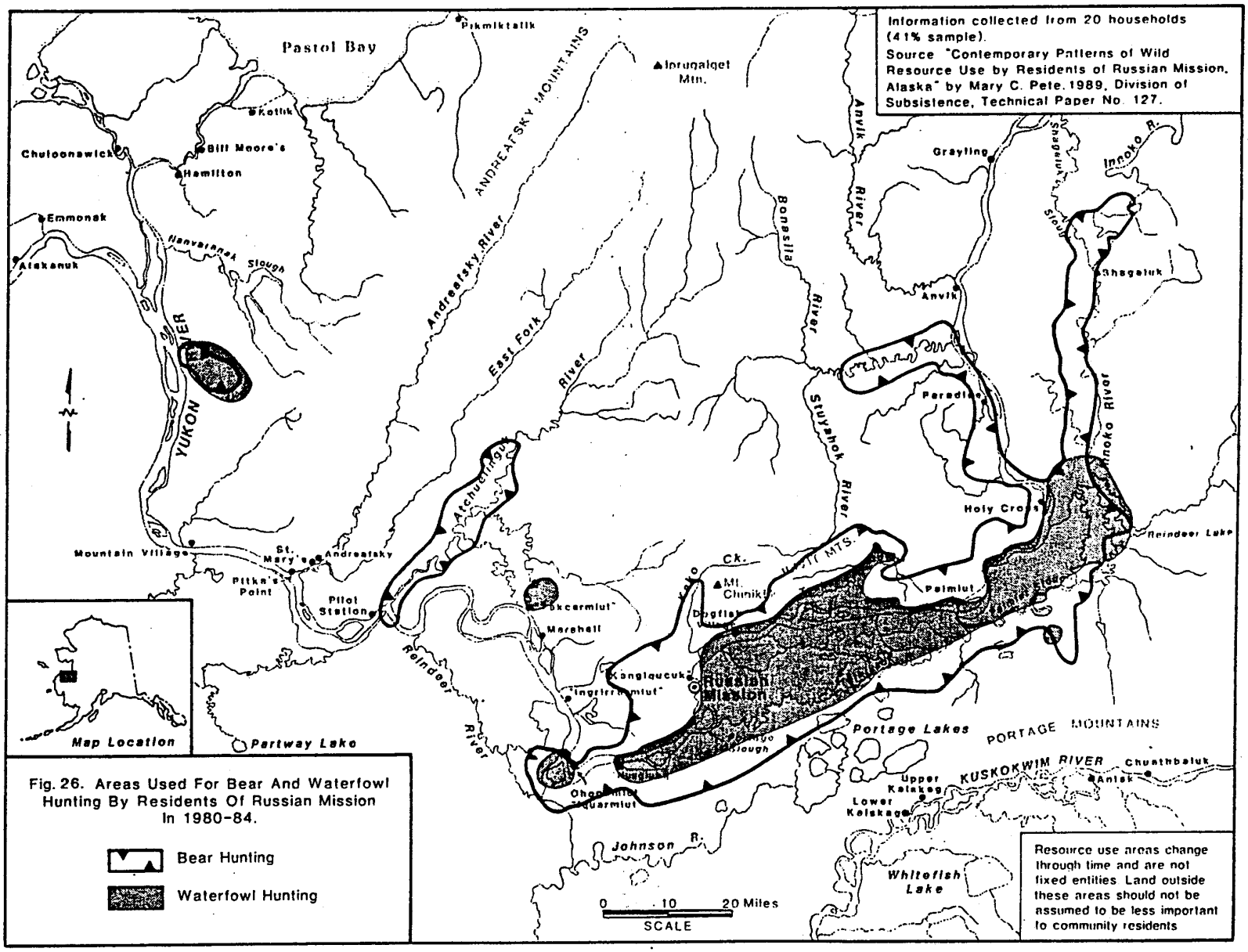


Fig. 1. Locations of communities and subsistence herring fishing areas.


GMU 22A
Information collected from 20 households (41% sample).
Source: "Contemporary Patterns of Wild Resource Use by Residents of Russian Mission, Alaska" by Mary C. Pete, 1989, Division of Subsistence, Technical Paper No. 127.
Pastol Bay
Pikmiktalik
Kotlik
Bill Moore's
Chuloonawick
Hamilton
Emmonak
Alakanuk
Nanvarnaka Slough
Andreasiksy River
East Fork
River
GMU 18
YUKON RIVER
Mountain Village
St. Mary's
Andreasiksy
Pitka's Point
Pilot Station
Marshall
Russian Mission
Kenegnaucuka
Ingerirermiut
Portage Slough
Reindeer River
Partway Lake
Nuuqluna
Ohogamiut
"Iquermiut"
Johnson River
Map Location
Fig. 25. Areas Used For Caribou Hunting By Residents of Russian Mission In 1980-84.
Caribou Hunting
GMU Boundary
GMU Subunit Boundary
0 10 20 Miles
SCALE
Grayling
Anvik
Shageluk
Paradise
Holy Cross
GMU 21E
Innoko River
Reindeer Lake
Dogfish Village
Mt. Chimiklik
Tucker S.
Polmiut
Polmiut Slough
GMU 21A
Portage Lakes
GMU 19A
KUSKOKWIM RIVER
Chuathbaluk
Aniak
Lower Kalskag
Wallefish Lake
Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.


Information collected from 20 households (41% sample).
Source "Contemporary Patterns of Wild Resource Use by Residents of Russian Mission, Alaska" by Mary C. Pete. 1989, Division of Subsistence, Technical Paper No. 127.
Pastol Bay
Pikmiktalik
Inrugalget Mtn.
ANDREAFSKY MOUNTAINS
Andreafsky River
East Fork
River
Bonasilla River
Anvik River
Grayling
Shageluk Slough
Innoko R.
Shageluk
Anvik
Paradise
Holy Cross
Innoko River
Reindeer Lake
Stuyahok River
Kotlik
Bill Moore's
Hamilton
Chuloonawick
Emmonak
Atakanuk
Nanvaranak Slough
YUKON RIVER
Mountain Village
St. Mary's
Andreafsky
Pitka's Point
Pilot Station
Atchuelinguk
Ck.
Mt. Chuniktu
HOLY MTS.
Palmlut
Dogfish
Marshall
Kangiqucuka
Russian Mission
Portage Lakes
PORTAGE MOUNTAINS
KUSKOKWIM RIVER
Chuathbaluk
Anisk
Upper Kalskag
Lower Kalskag
Reindeer River
Partway Lake
Johnson R.
Whitefish Lake
Map Location
0 10 20 Miles
SCALE
Fig. 26. Areas Used For Bear And Waterfowl Hunting By Residents Of Russian Mission In 1980-84.
Bear Hunting
Waterfowl Hunting
Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents

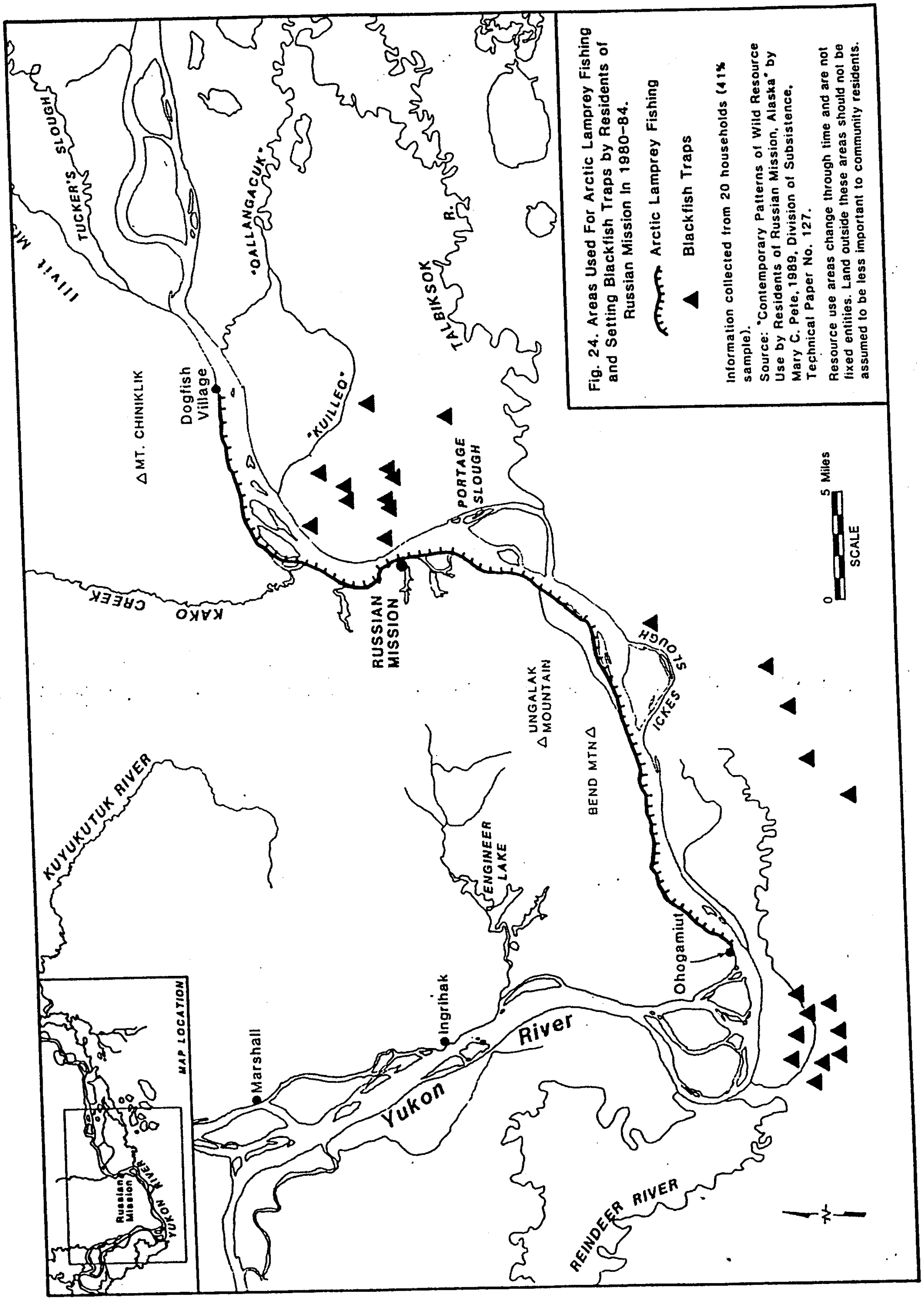


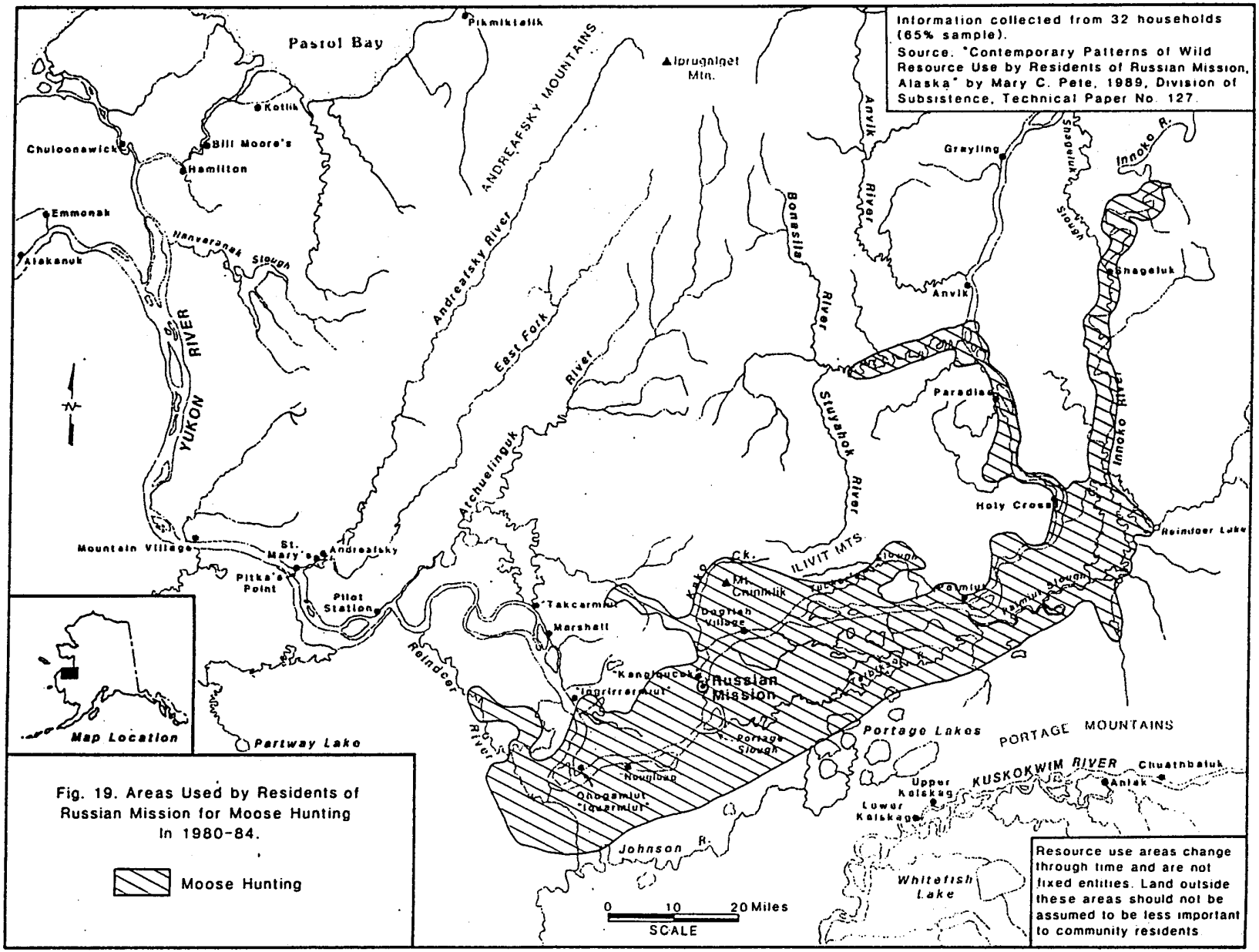
Fig. 24. Areas Used For Arctic Lamprey Fishing and Setting Blackfish Traps by Residents of Russian Mission In 1980-84.

Arctic Lamprey Fishing

Blackfish Traps

Information collected from 20 households (41% sample).
Source: "Contemporary Patterns of Wild Resource Use by Residents of Russian Mission, Alaska" by Mary C. Pete, 1989, Division of Subsistence, Technical Paper No. 127.

Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents.


Information collected from 32 households (65% sample).
Source. "Contemporary Patterns of Wild Resource Use by Residents of Russian Mission, Alaska" by Mary C. Pete, 1989, Division of Subsistence, Technical Paper No. 127.
Pastol Bay
Pikmiktalik
Iprugniget Mtn.
ANDREAFSKY MOUNTAINS
Kotlik
Chuloonawick
Bill Moore's
Hamilton
Emmonak
Alakanuk
Nanvaranak Slough
YUKON RIVER
Andreafsky River
East Fork River
Atchuelinguk
Bonasila River
Anvik River
Grayling
Anvik
Shageluk
Innoko R.
Paradise
Holy Cross
Reindeer Lake
Stuyahok River
ILIVIT MTS
Mountain Village
St. Mary's
Andreafsky
Pitka's Point
Pilot Station
Takcarmiut
Marshall
Mt. Chinnilik
Dagtiah Village
Russian Mission
Kangloucka
Tapprirrarmiut
Portage Slough
Portage Lakes
PORTAGE MOUNTAINS
KUSKOKWIM RIVER
Chuathbaluk
Upper Kalskag
Lower Kalskag
Aniak
Reindeer River
Partway Lake
Nowlbag
Oho-gamiut
Iquarmiut
Johnson R.
Whitefish Lake
Map Location
0 10 20 Miles
SCALE
Moose Hunting
Fig. 19. Areas Used by Residents of Russian Mission for Moose Hunting In 1980-84.
Resource use areas change through time and are not fixed entities. Land outside these areas should not be assumed to be less important to community residents

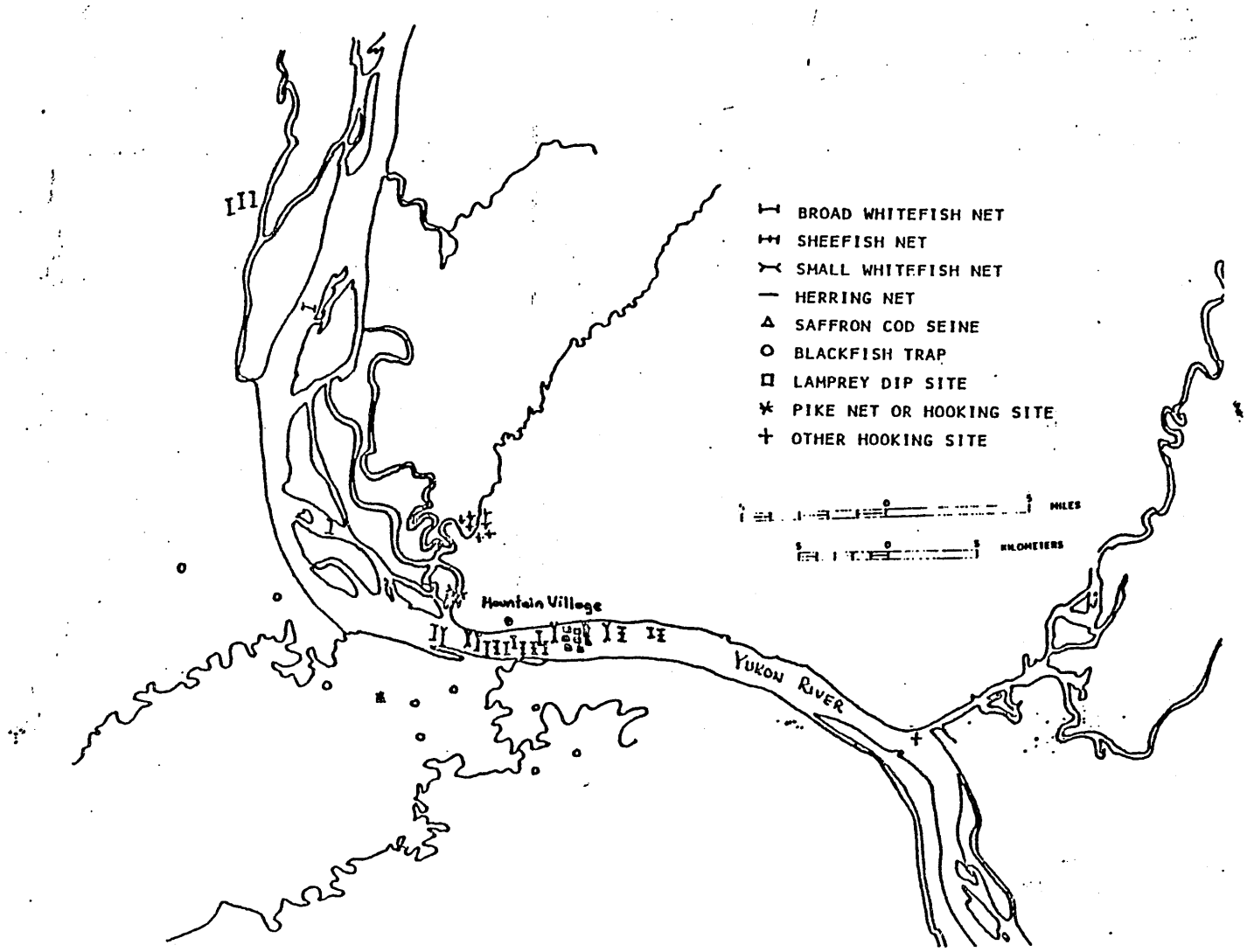


Figure 15. Fishing locations for non-salmon fish species, June 1980-May 1981, of a sample of households from Mountain Village (n=16)

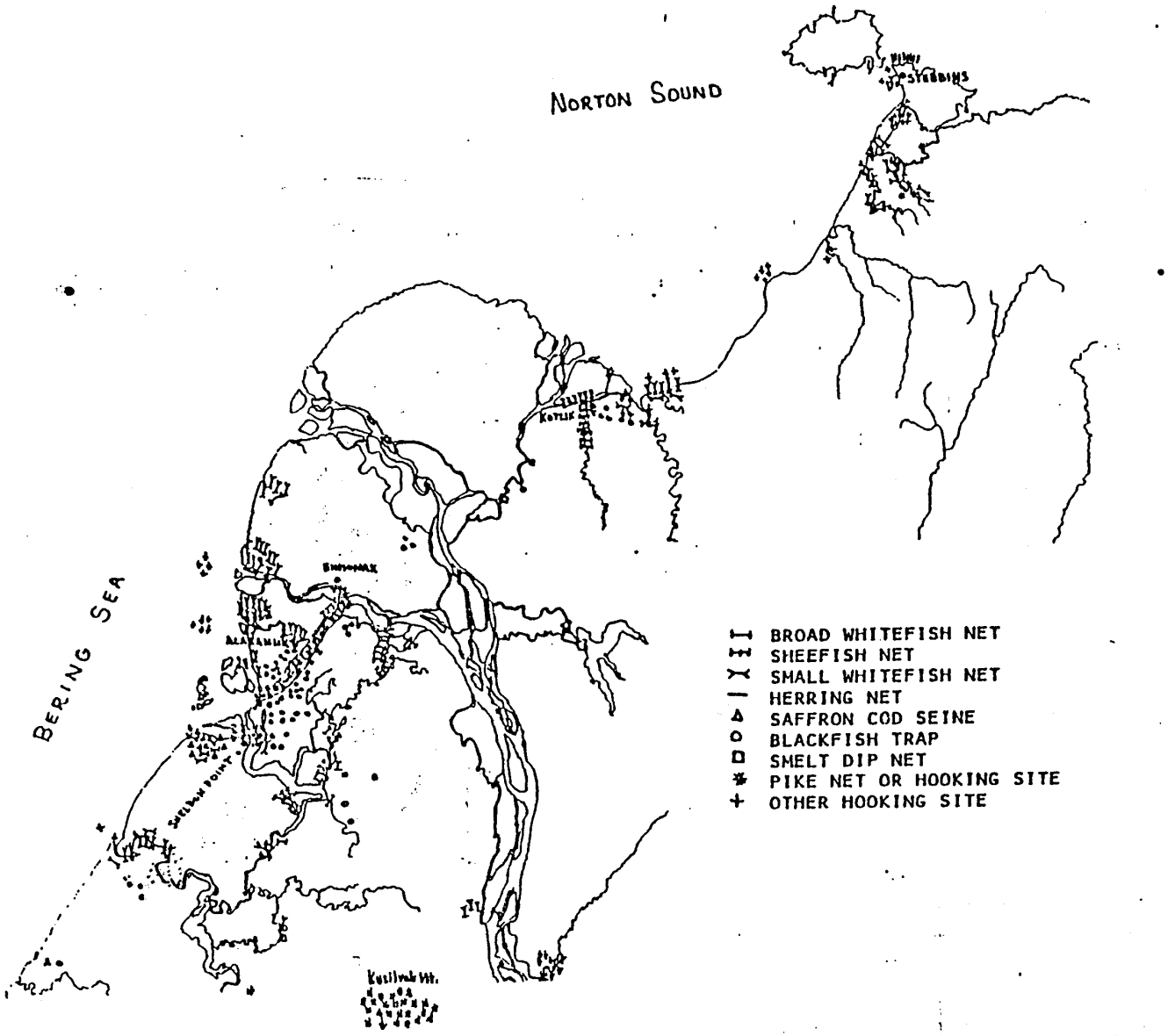
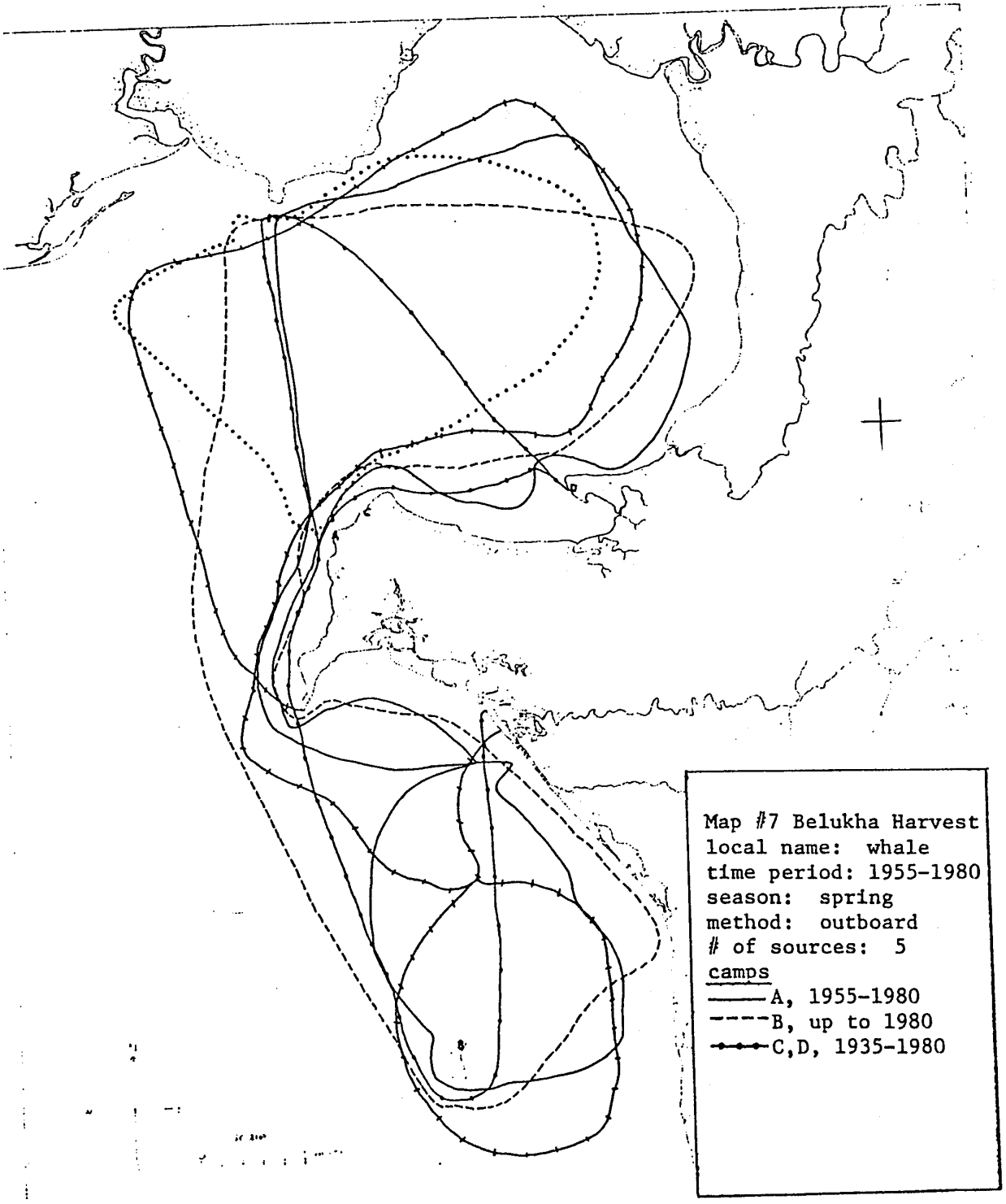
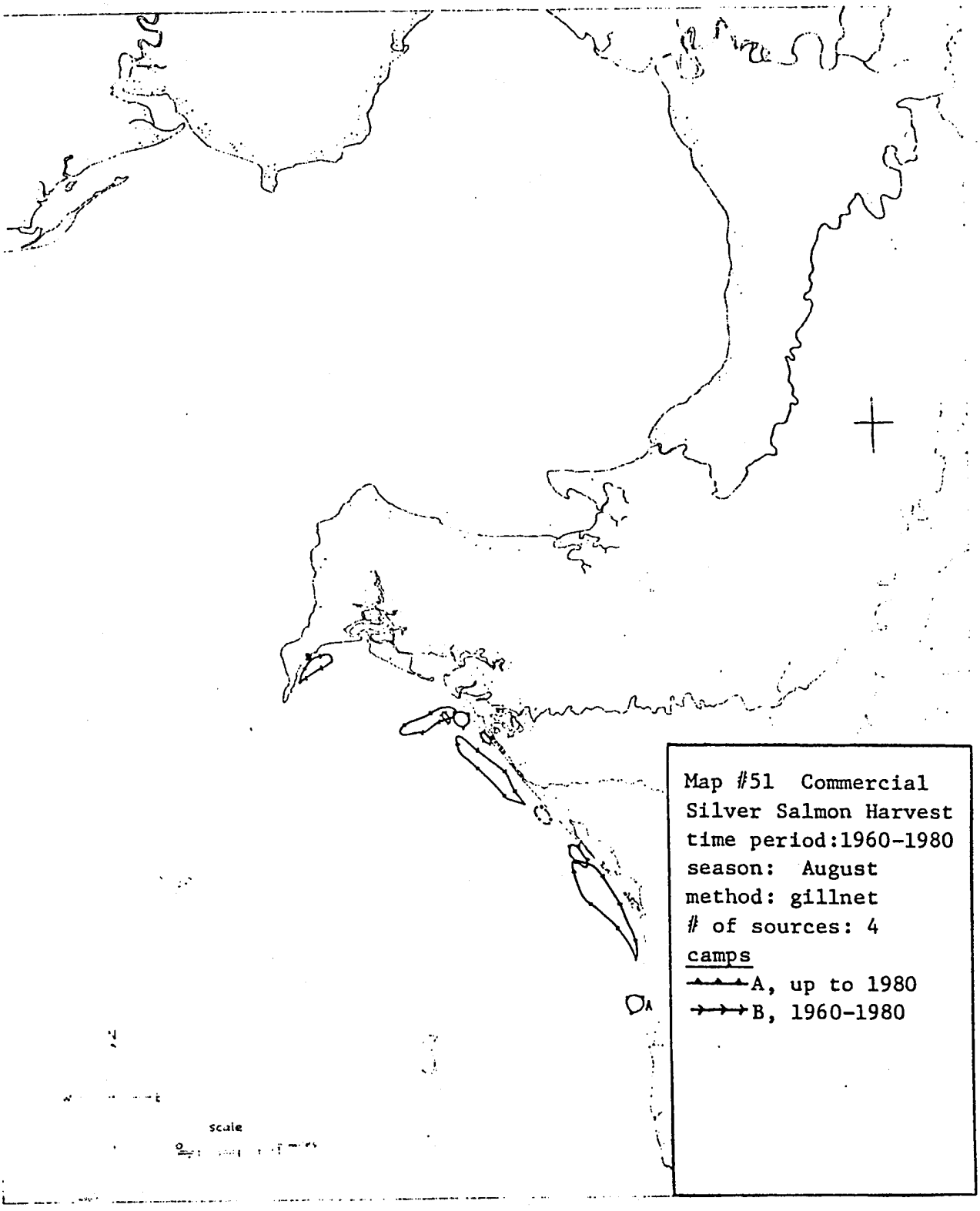
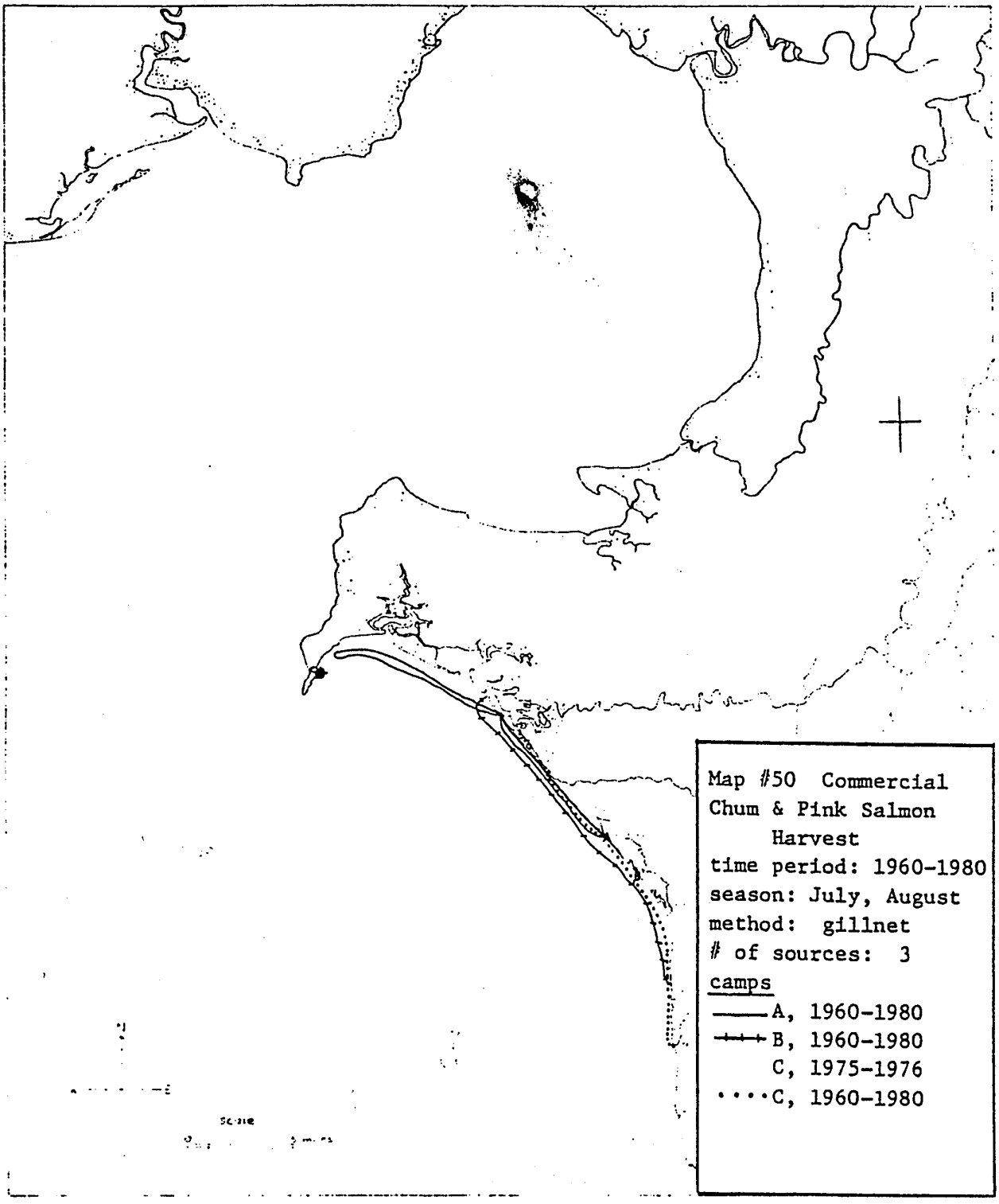
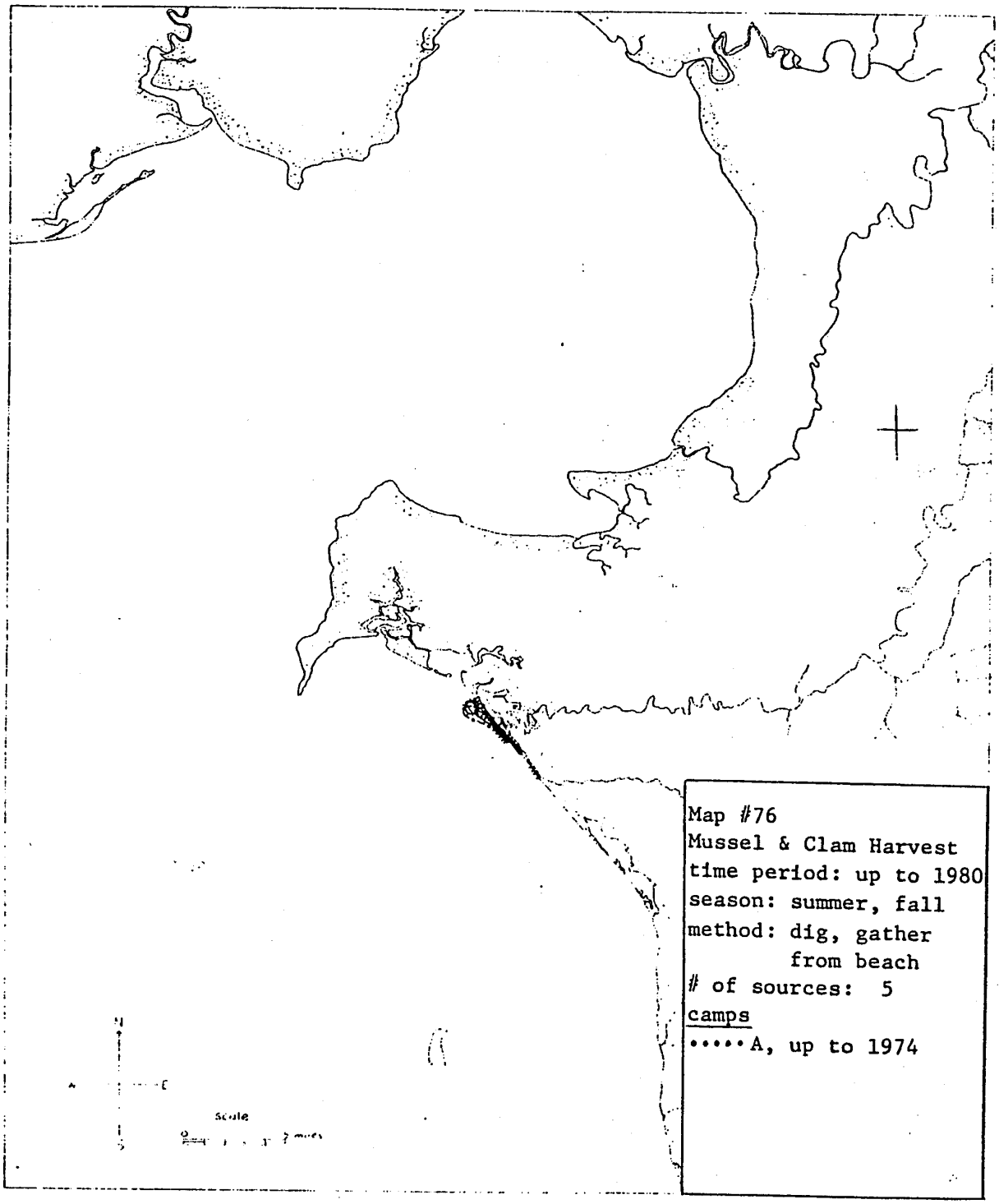


Figure 9. Fishing locations for non-salmon fish species, June 1980-May 1981, based on a sample of 88 households from Alakanuk, Emmonak, Kotlik, Mountain Village, Sheldon Point, and Stebbins. (Mountain Village locations partially shown. See Figures 10-17.)

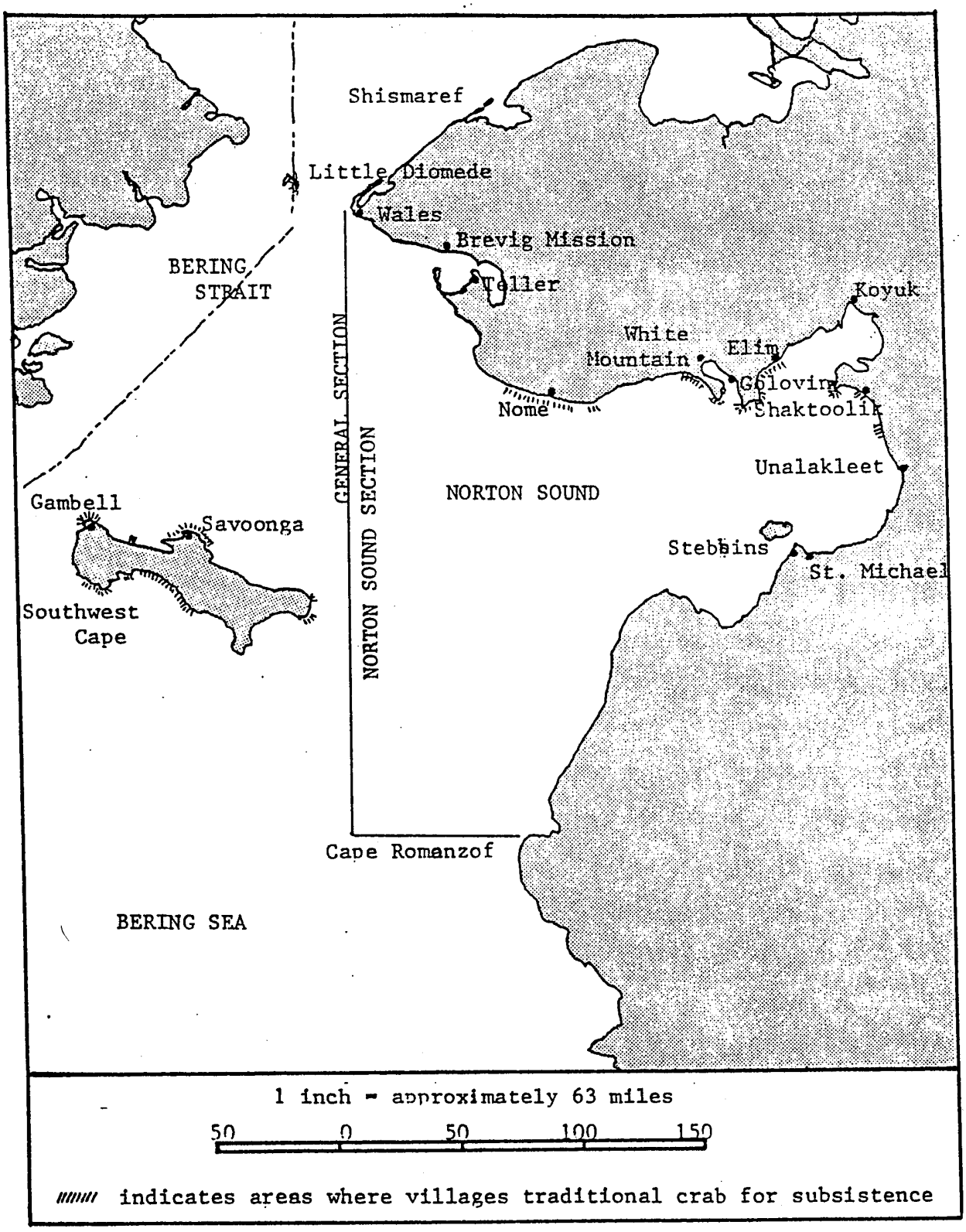

Map #7 Belukha Harvest
local name: whale
time period: 1955-1980
season: spring
method: outboard
# of sources: 5
camps
A, 1955-1980
B, up to 1980
C,D, 1935-1980


Map #51 Commercial
Silver Salmon Harvest
time period:1960-1980
season: August
method: gillnet
# of sources: 4
camps
A, up to 1980
B, 1960-1980
scale


Map #50 Commercial
Chum & Pink Salmon
Harvest
time period: 1960-1980
season: July, August
method: gillnet
# of sources: 3
camps
A, 1960-1980
B, 1960-1980
C, 1975-1976
C, 1960-1980


Map #76
Mussel & Clam Harvest
time period: up to 1980
season: summer, fall
method: dig, gather
from beach
# of sources: 5
camps
•••••A, up to 1974
Scale

Map 1


Shismaref
Little Diomede
Wales
Brevig Mission
BERING STRAIT
Teller
Koyuk
White Mountain
Elim
Golovin
Nome
Shaktoolik
Unalakleet
GENERAL SECTION
NORTON SOUND SECTION
NORTON SOUND
Gambell
Savoonga
Stebbins
St. Michael
Southwest Cape
Cape Romanzof
BERING SEA
1 inch = approximately 63 miles
50 0 50 100 150
indicates areas where villages traditional crab for subsistence

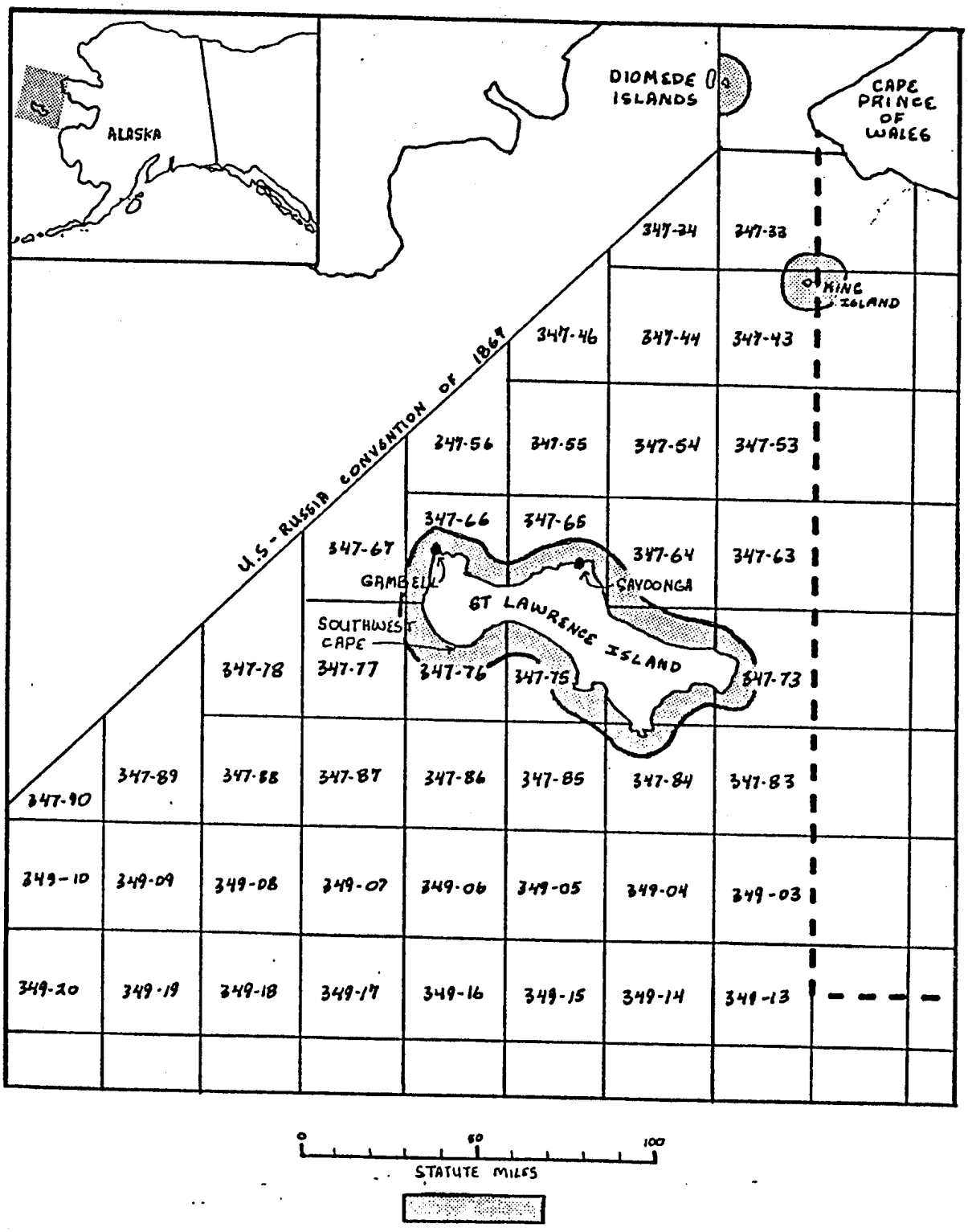


Figure 1. The Southern Portion of the St. Lawrence Island Section of the Northern District of Statistical Area Q (Bering Sea). The map shows the location of the villages of Gambell and Savoonga on St. Lawrence Island, where Subsistence crabbing surveys were conducted in 1984.

SENSITIVE AREAS: ATTACHMENT TWO

ALASKA DEPARTMENT OF FISH AND GAME

Index Salmon Stream Escapement Data

TO BE DEVELOPED

SENSITIVE AREAS: ATTACHMENT THREE

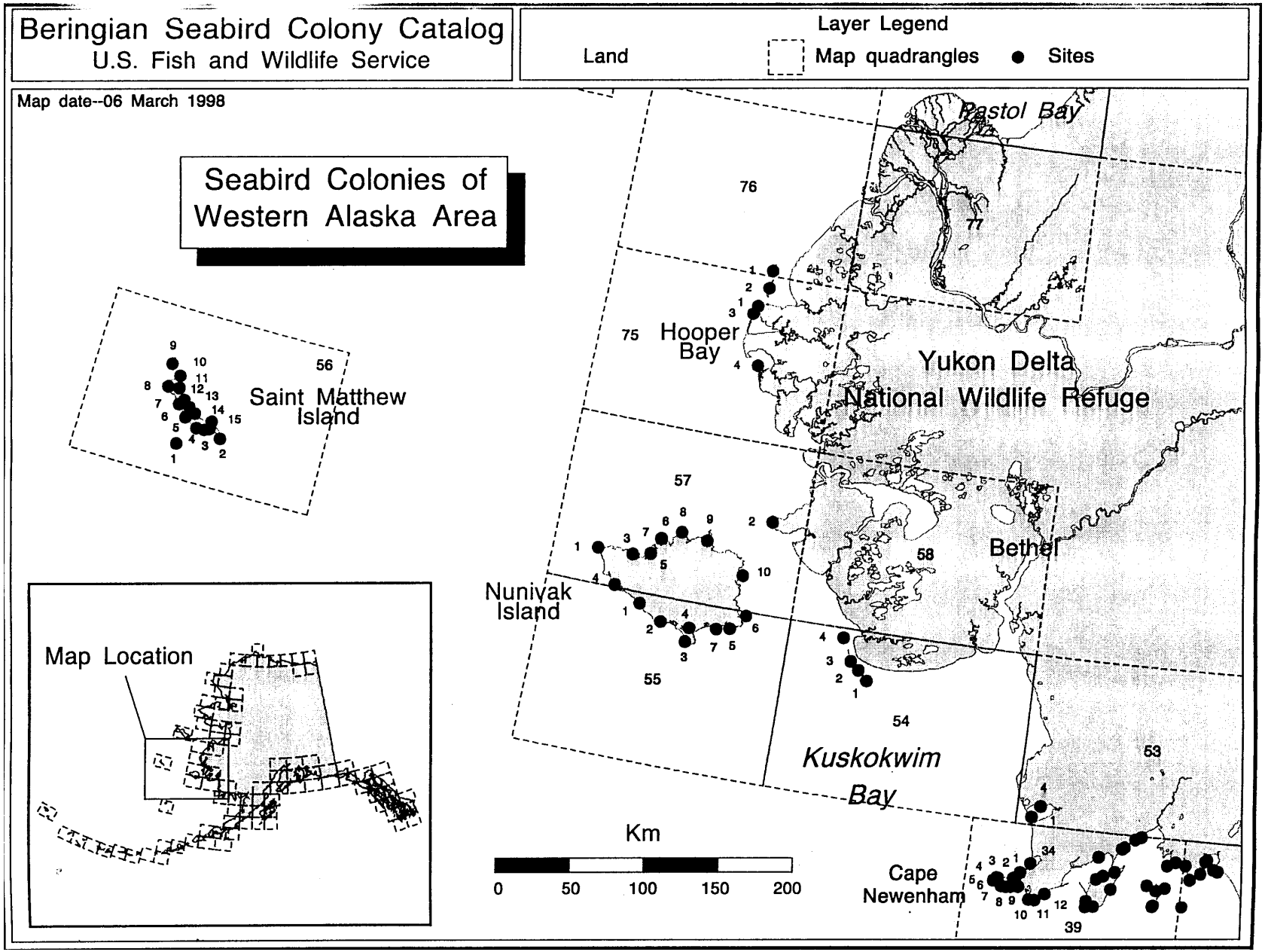
U.S. FISH AND WILDLIFE SERVICE

Seabird Colonies

The Alaskan Seabird Colony Catalog is an automated database that contains the distributions of breeding seabirds and the relative size of all the colonies in Alaska. The data reports indicating estimated species composition and numbers for seabird colonies of the Bering Sea are summarized from the catalog. The maps display colony locations. The Alaska Seabird Colony Catalog is maintained by the U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Marine and Coastal Bird Project, in Anchorage. Questions or comments regarding the information contained in the Alaska Seabird Colony Catalog should be directed to the U.S. Fish and Wildlife Service at 786-3691. For updated information try the internet at: http://164.159.151.5/seabird/main_seabird.html

Seabirds Identified at colonies in the subarea:

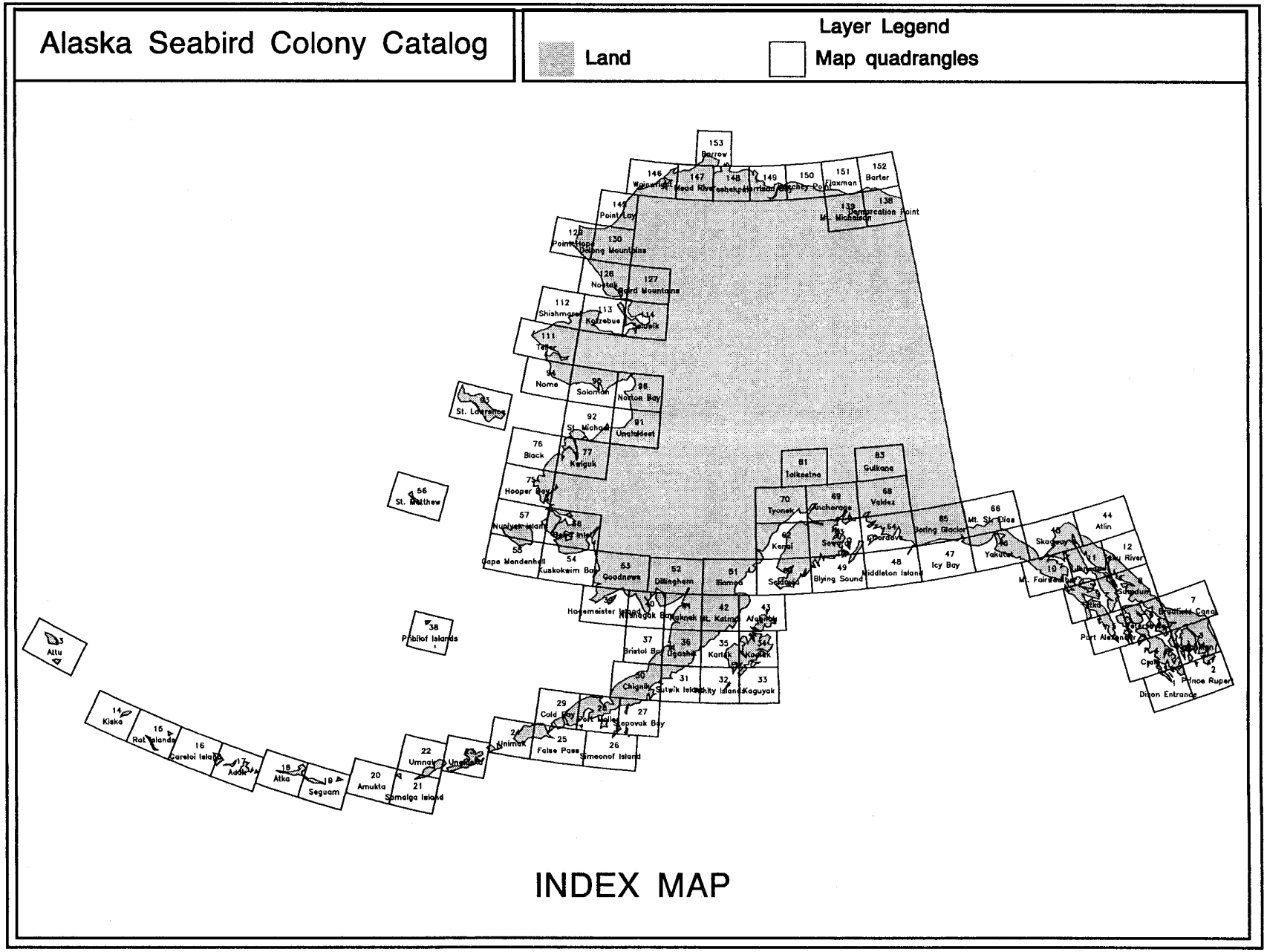
Species Present	Estimated Population
Glaucous-winged gull	5,954
Glaucous Gull	2,180
Common murre	220,700
Thick-billed murre	379,670
Unidentified murre	709,430
Tufted puffin	89,125
Horned puffin	19,034
Black-legged kittiwake	243,013
Parakeet auklet	30,750
Least auklet	872,100
Crested auklet	187,000
Aleutian tern	869
Arctic tern	263
Common eider	110
Pigeon guillemot	3,698
Black guillemot	0
Northern fulmar	417,950
Double-crested cormorant	600
Pelagic cormorant	4,240
Red-faced cormorant	15
Unidentified cormorant	1,495


Beringian Seabird Colony Catalog
U.S. Fish and Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
Map date--06 March 1998
Seabird Colonies of Western Alaska Area
Pastol Bay
76
77
75
Hooper Bay
Yukon Delta National Wildlife Refuge
56
Saint Matthew Island
57
58
Bethel
Nunivak Island
55
54
Kuskokwim Bay
53
Map Location
Km
0
50
100
150
200
Cape Newenham
39

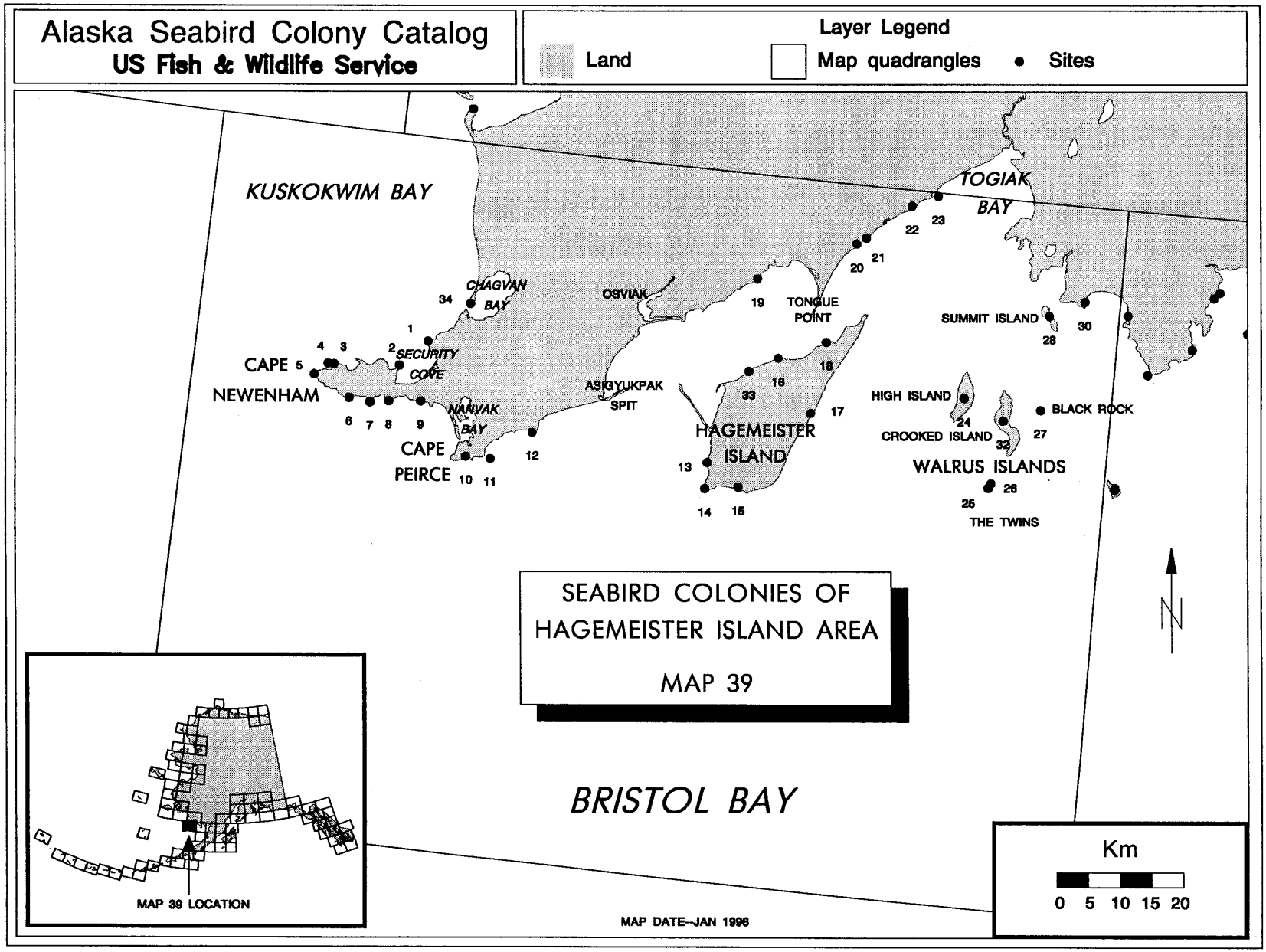
Insert Map, Western Alaska Contingency Plan Subarea with 2000 Seabird Population, here - to view the map from the ARRT website, please go to the DNR ***Prevention and Emergency Response Subarea Plan Maps*** website located at:

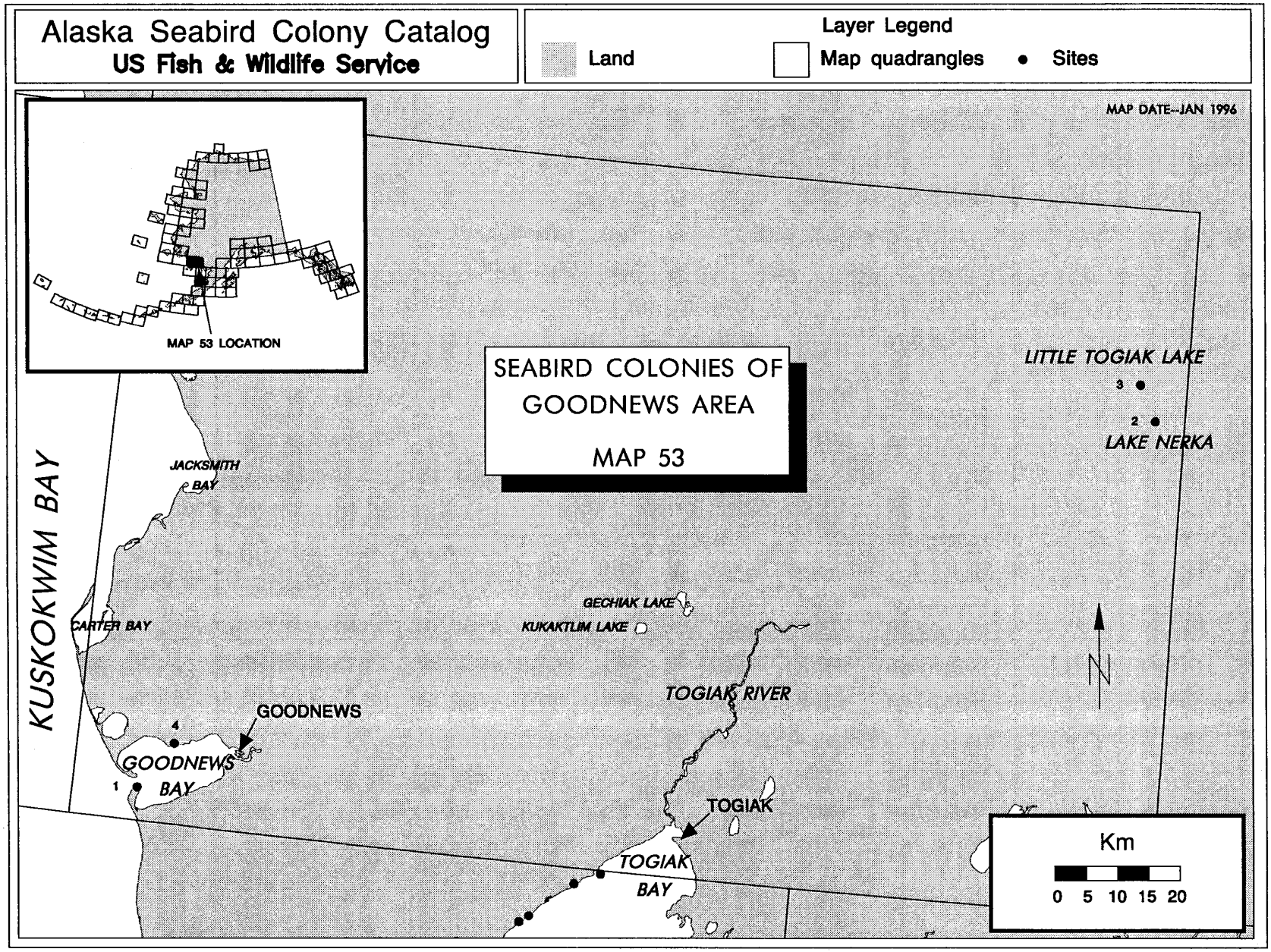
http://www.asgdc.state.ak.us/maps/cplans/subareas.html#western

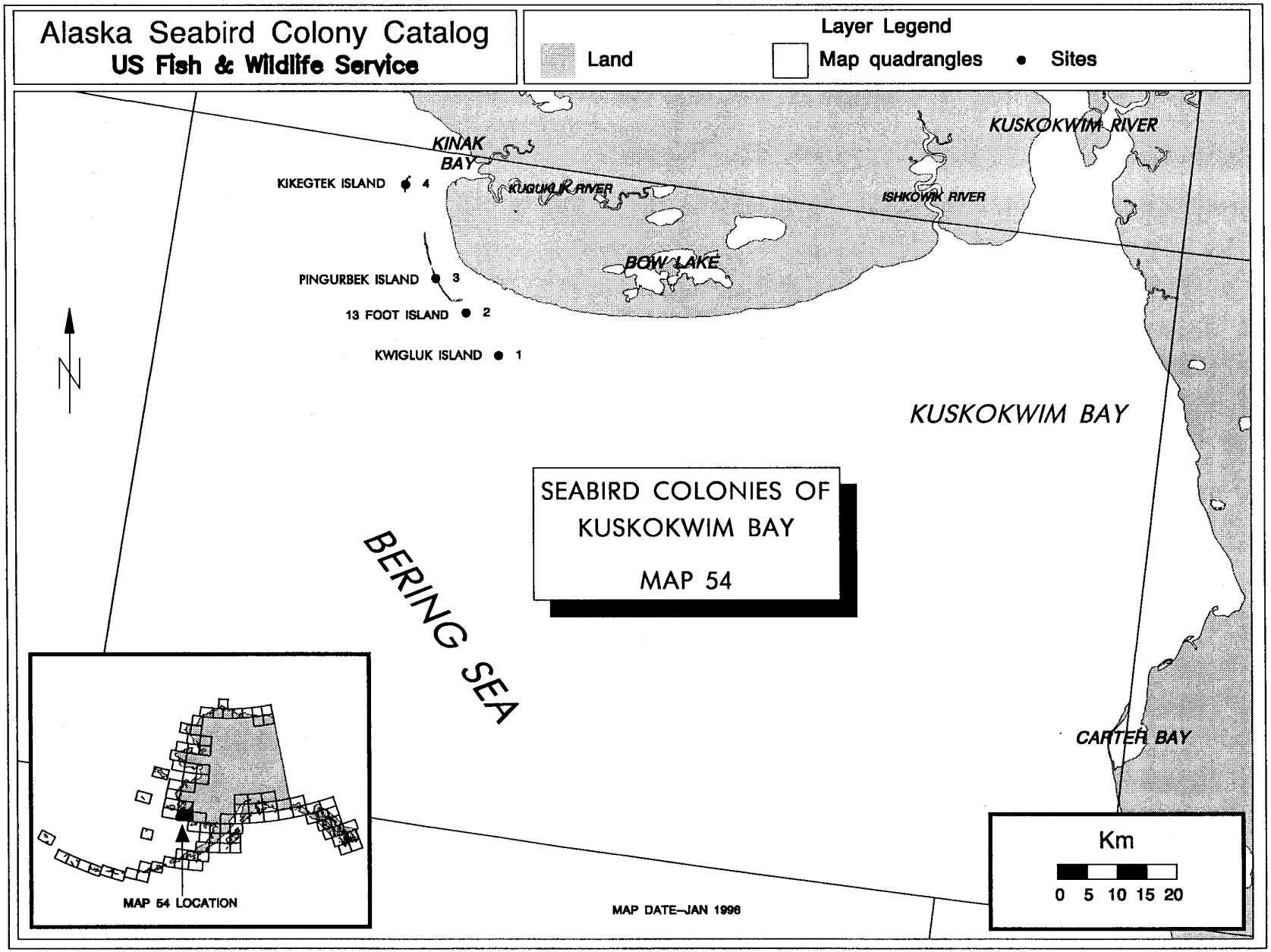
Alaska Seabird Colony Catalog

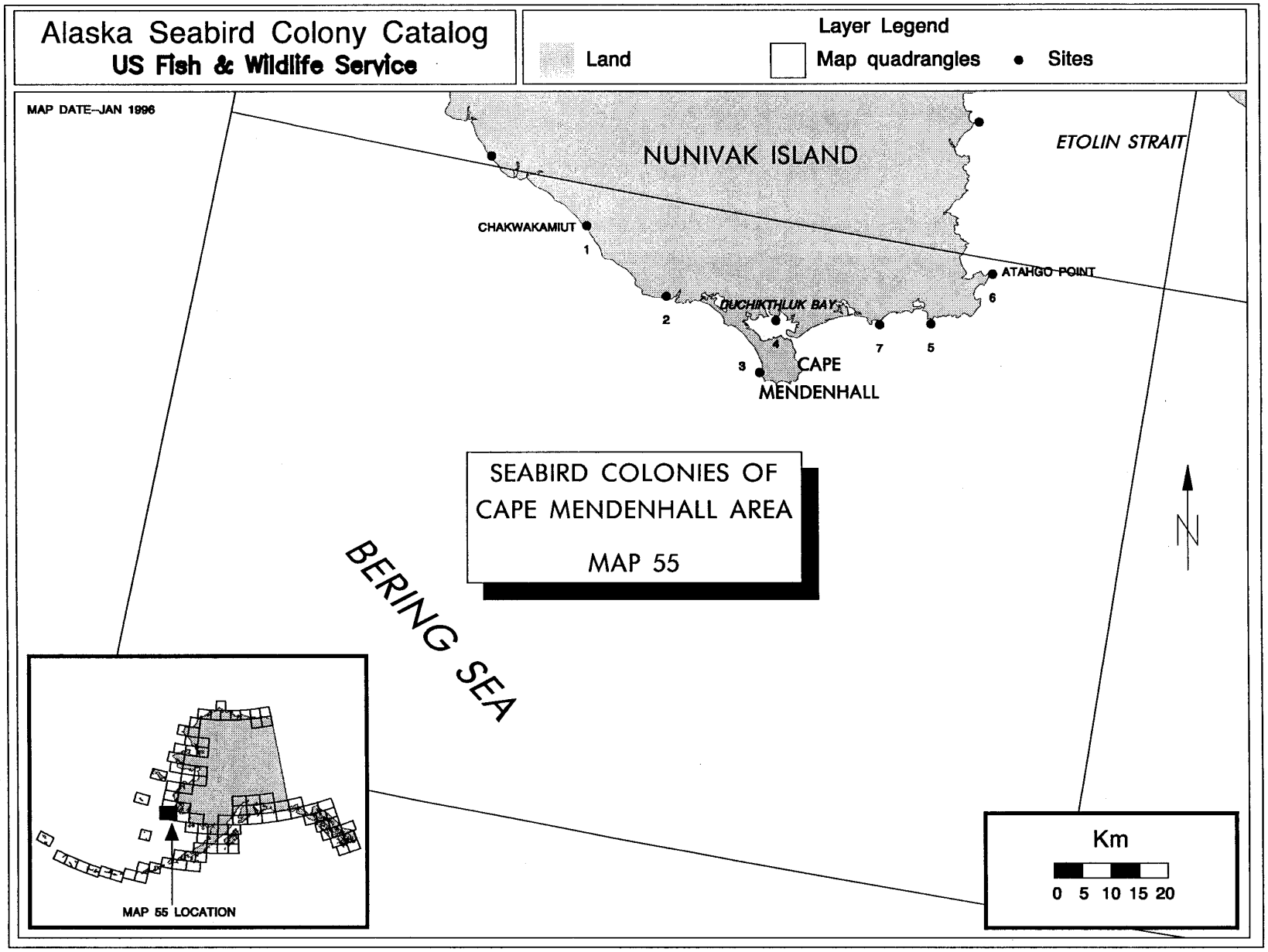


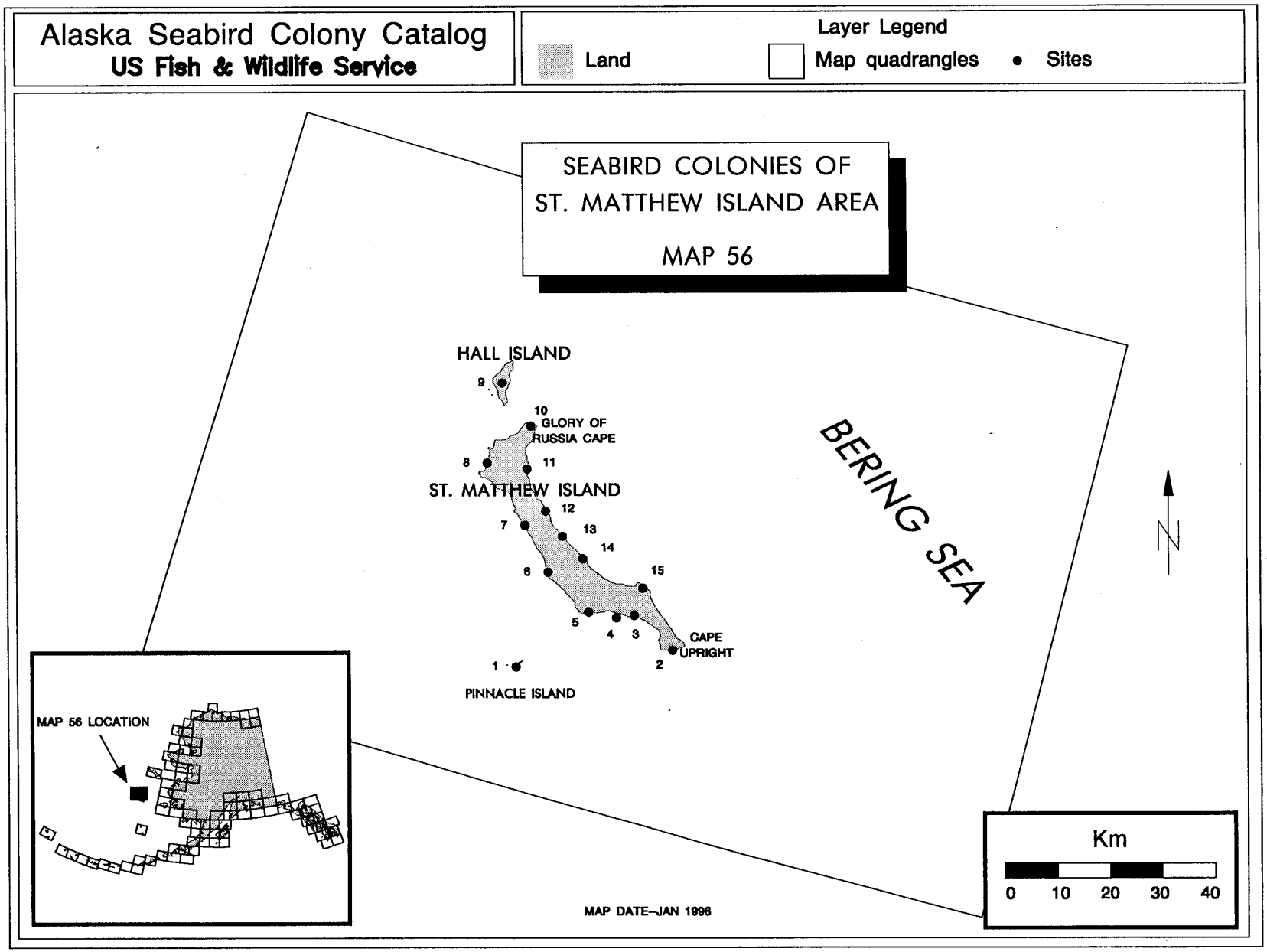
INDEX MAP

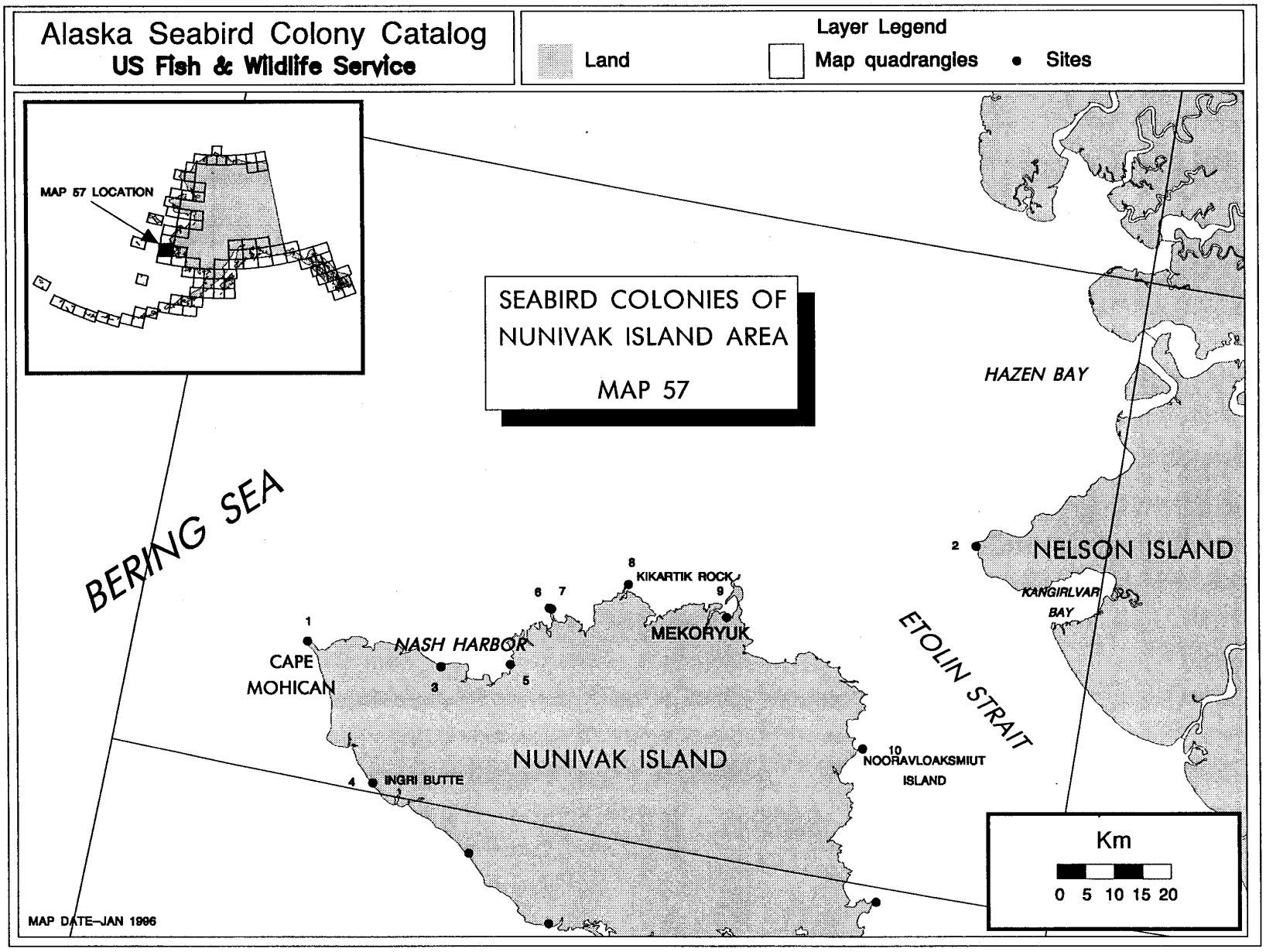

Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
KUSKOKWIM BAY
TOGIAK BAY
CHAGVAN BAY
OSVIAK
TONGUE POINT
SUMMIT ISLAND
SECURITY COVE
CAPE NEWENHAM
ASIGYUKPAK SPIT
NANVAK BAY
CAPE PEIRCE
HAGEMEISTER ISLAND
HIGH ISLAND
BLACK ROCK
CROOKED ISLAND
WALRUS ISLANDS
THE TWINS
SEABIRD COLONIES OF
HAGEMEISTER ISLAND AREA
MAP 39
BRISTOL BAY
MAP 39 LOCATION
MAP DATE--JAN 1996
Km
0 5 10 15 20

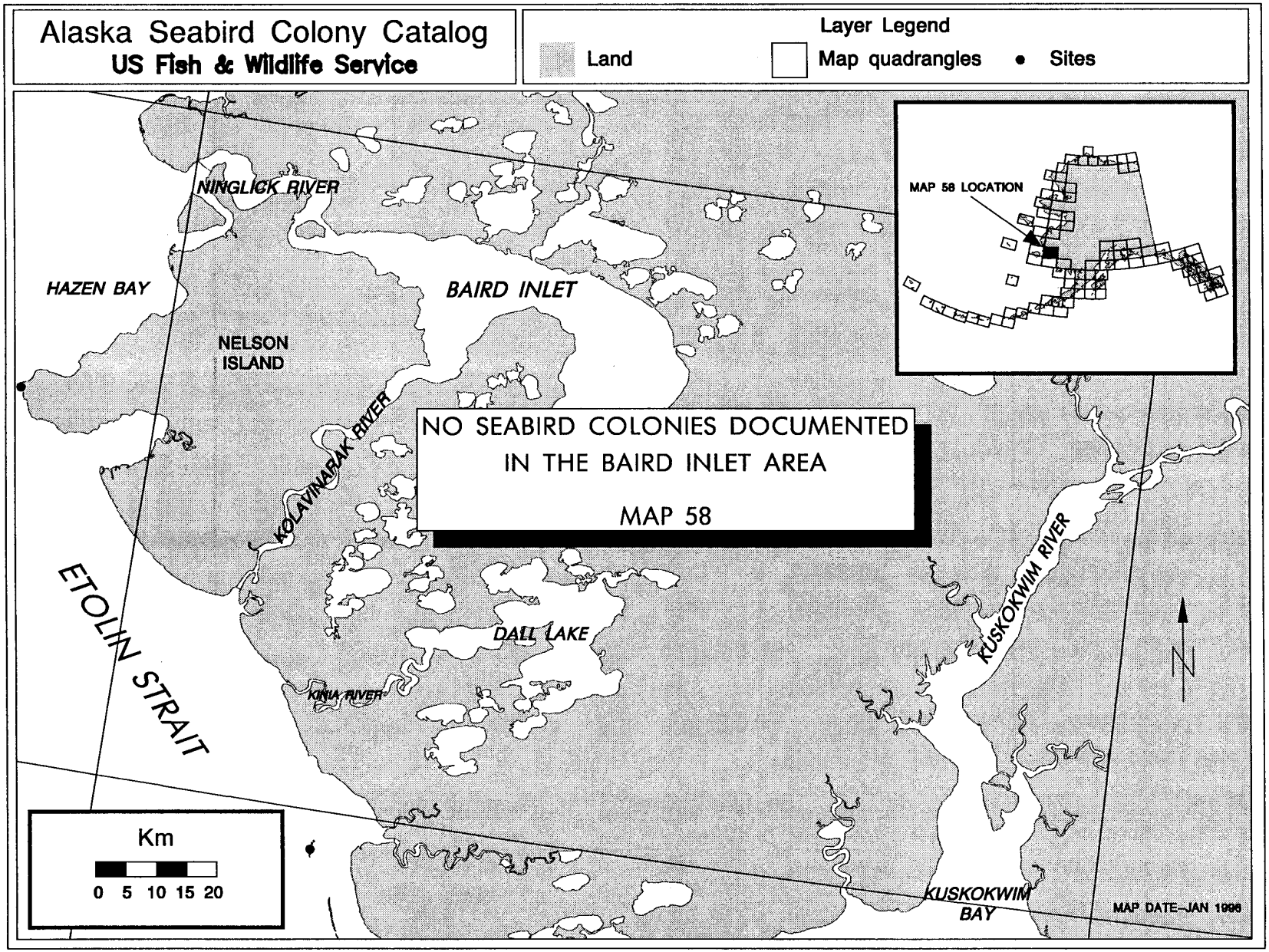

Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP DATE--JAN 1996
MAP 53 LOCATION
SEABIRD COLONIES OF
GOODNEWS AREA
MAP 53
LITTLE TOGIAK LAKE
3
2
LAKE NERKA
JACKSMITH
BAY
KUSKOKWIM BAY
CARTER BAY
GECHIAK LAKE
KUKAKTLIM LAKE
TOGIAK RIVER
GOODNEWS
4
GOODNEWS
BAY
1
TOGIAK
TOGIAK
BAY
N
Km
0 5 10 15 20

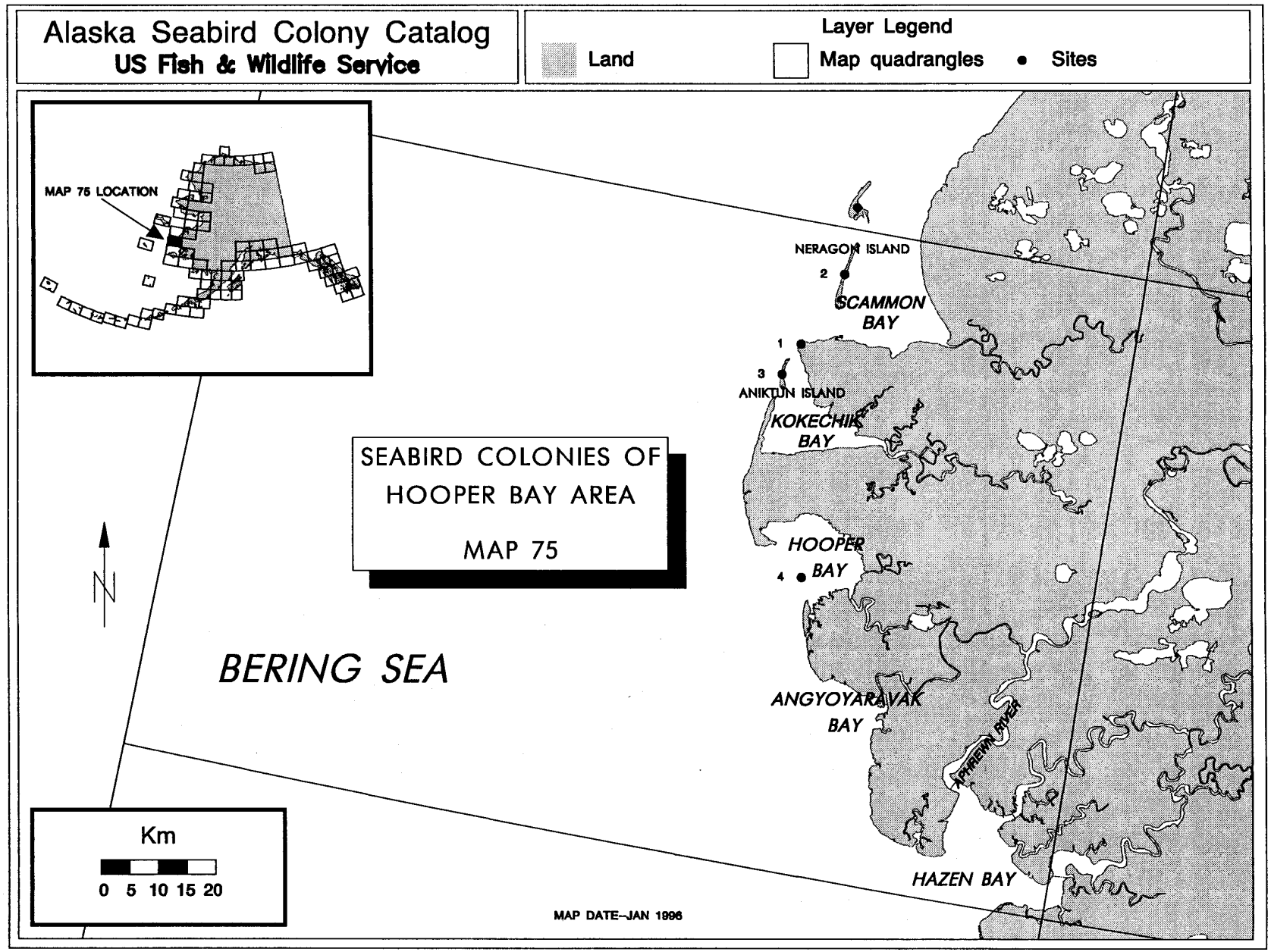

Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
KUSKOKWIM RIVER
KINAK BAY
KIKEGTEK ISLAND 4
KUGKULIK RIVER
ISHKOWIK RIVER
BOW LAKE
PINGURBEK ISLAND 3
13 FOOT ISLAND 2
KWIGLUK ISLAND 1
N
KUSKOKWIM BAY
SEABIRD COLONIES OF
KUSKOKWIM BAY
MAP 54
BERING SEA
CARTER BAY
MAP 54 LOCATION
MAP DATE–JAN 1996
Km
0 5 10 15 20

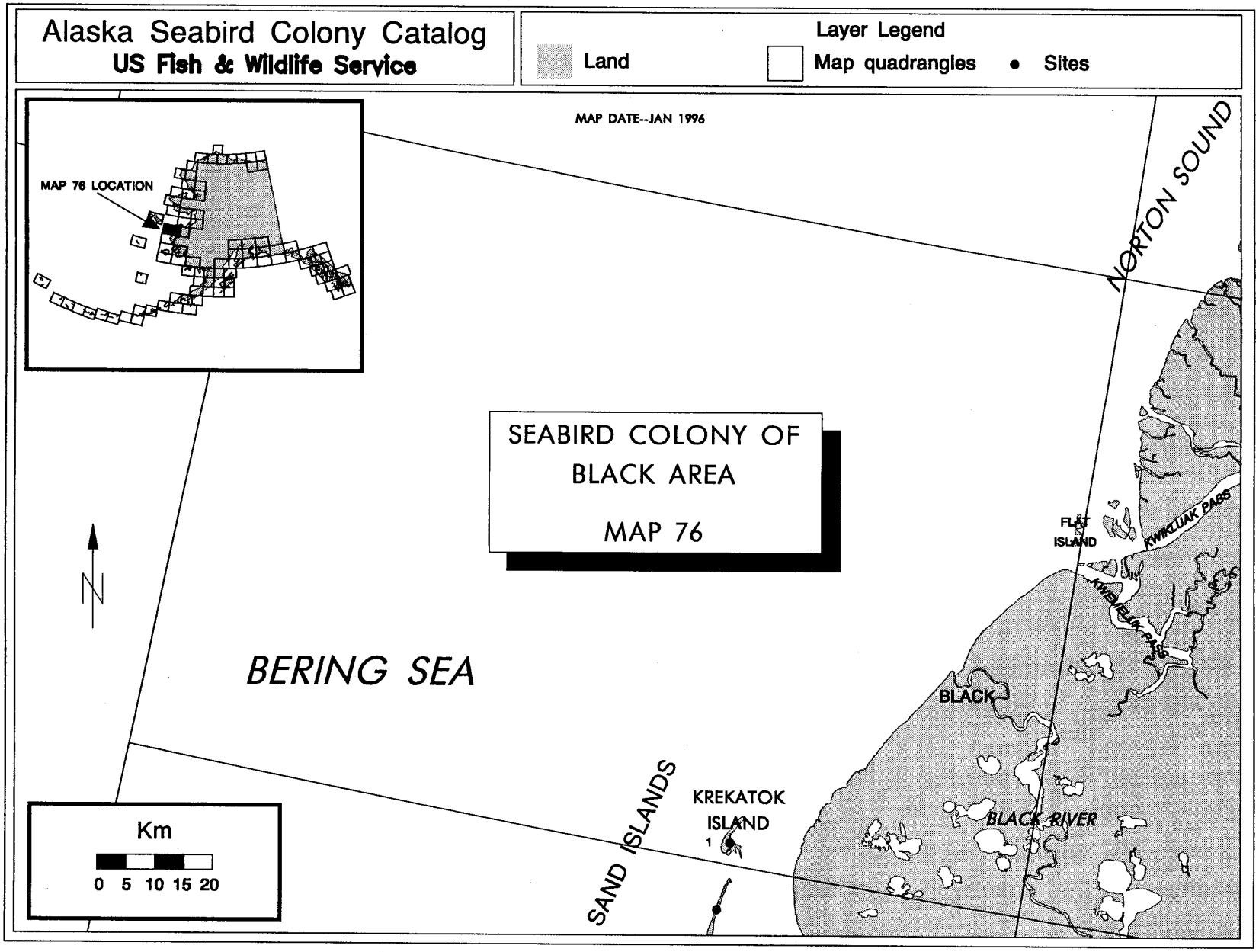

Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP DATE–JAN 1996
NUNIVAK ISLAND
ETOLIN STRAIT
CHAKWAKAMIUT
1
ATAHGO POINT
6
2
DUCHIKTHLUK BAY
4
7
5
3
CAPE
MENDENHALL
SEABIRD COLONIES OF
CAPE MENDENHALL AREA
MAP 55
BERING SEA
N
MAP 55 LOCATION
Km
0 5 10 15 20

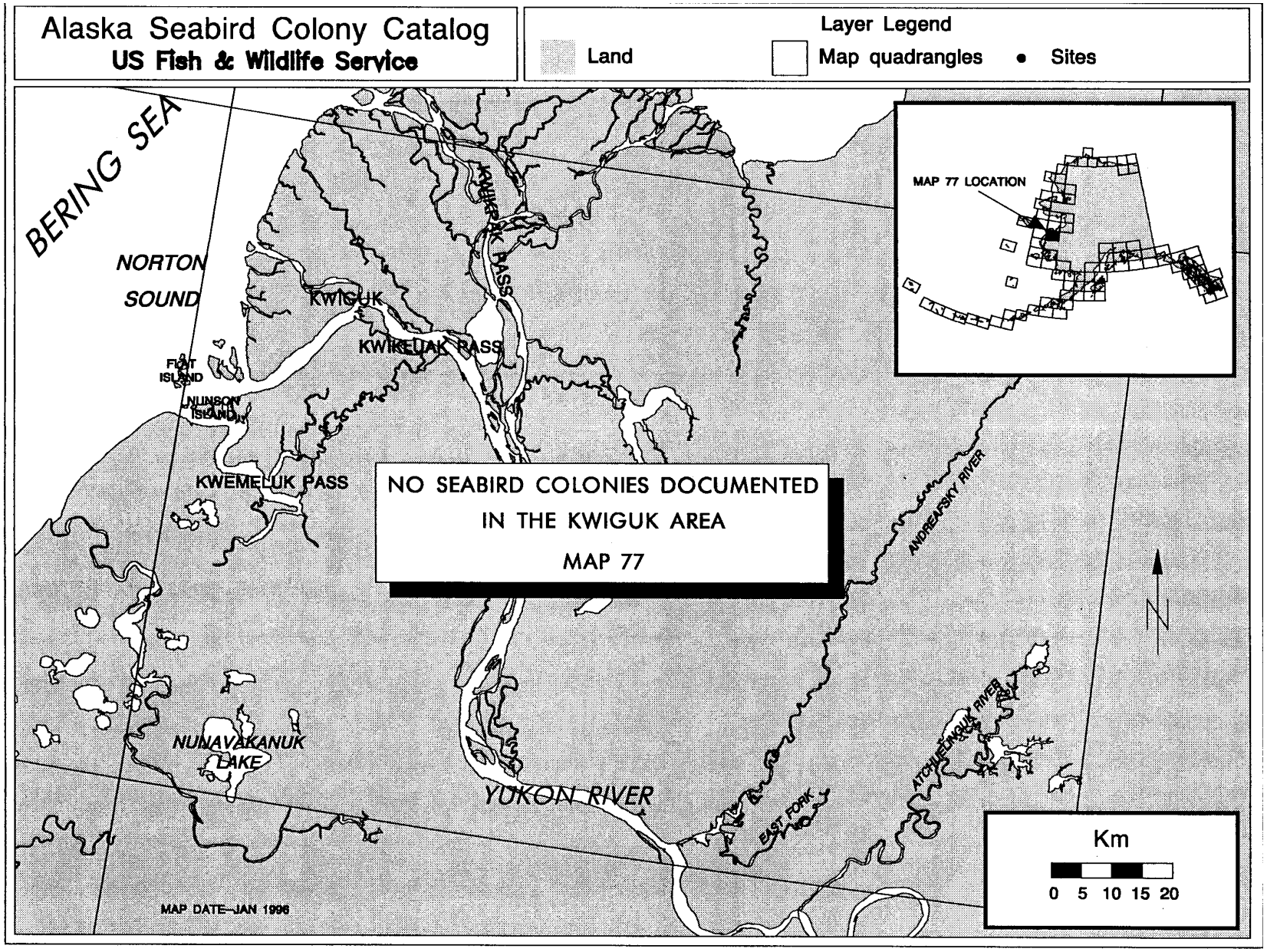

Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
SEABIRD COLONIES OF
ST. MATTHEW ISLAND AREA
MAP 56
HALL ISLAND
9
10
GLORY OF
RUSSIA CAPE
8
11
ST. MATTHEW ISLAND
12
7
13
14
6
15
5
4
3
CAPE
UPRIGHT
2
1
PINNACLE ISLAND
BERING SEA
N
MAP 56 LOCATION
Km
0
10
20
30
40
MAP DATE-JAN 1996


Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP 57 LOCATION
SEABIRD COLONIES OF
NUNIVAK ISLAND AREA
MAP 57
BERING SEA
HAZEN BAY
NELSON ISLAND
KANGIRLVAR
BAY
ETOLIN STRAIT
KIKARTIK ROCK
MEKORYUK
NASH HARBOR
CAPE
MOHICAN
NUNIVAK ISLAND
INGRI BUTTE
NOORAVLOAKSMIUT
ISLAND
1
2
3
4
5
6
7
8
9
10
Km
0 5 10 15 20
MAP DATE–JAN 1996


Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP 58 LOCATION
NINGLICK RIVER
HAZEN BAY
BAIRD INLET
NELSON ISLAND
KOLAVINARAK RIVER
NO SEABIRD COLONIES DOCUMENTED
IN THE BAIRD INLET AREA
MAP 58
ETOLIN STRAIT
DALL LAKE
KINIA RIVER
KUSKOKWIM RIVER
KUSKOKWIM BAY
N
Km
0 5 10 15 20
MAP DATE–JAN 1998


Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP 75 LOCATION
NERAGON ISLAND
2
SCAMMON BAY
1
3
ANIKTUN ISLAND
KOKECHIK BAY
SEABIRD COLONIES OF
HOOPER BAY AREA
MAP 75
HOOPER BAY
4
BERING SEA
ANGYOYARAVAK BAY
APHREWN RIVER
HAZEN BAY
Km
0 5 10 15 20
MAP DATE--JAN 1996


Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
MAP DATE--JAN 1996
MAP 76 LOCATION
NORTON SOUND
SEABIRD COLONY OF
BLACK AREA
MAP 76
BERING SEA
FLAT ISLAND
KWIKLUAK PASS
KWIKLUK PASS
BLACK
BLACK RIVER
SAND ISLANDS
KREKATOK ISLAND
1
Km
0 5 10 15 20


Alaska Seabird Colony Catalog
US Fish & Wildlife Service
Layer Legend
Land
Map quadrangles
Sites
BERING SEA
NORTON SOUND
KWIGUK
KWIKPAK PASS
KWIKLUAK PASS
FLAT ISLAND
NUNSON ISLAND
KWEMELUK PASS
NUNAVAKANUK LAKE
YUKON RIVER
EAST FORK
ATCHUELENGUK RIVER
ANDREAFSKY RIVER
MAP 77 LOCATION
NO SEABIRD COLONIES DOCUMENTED
IN THE KWIGUK AREA
MAP 77
N
Km
0 5 10 15 20
MAP DATE--JAN 1996

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